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BOUNDARY COMMISSION
1954

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Publications

REPORT OF THE COMMISSIONERS

ON THE SURVEY OF THE BOUNDARY BETWEEN THE
PROVINCES OF ONTARIO AND MANITOBA
FROM THE TWELFTH BASE LINE OF THE SYSTEM
OF DOMINION LANDS SURVEYS
TO THE SOUTHERN SHORE OF HUDSON BAY AND THE
RETRACEMENT AND RESTORATION OF
THE BOUNDARY FROM THE NORTHWEST ANGLE OF THE
LAKE OF THE WOODS TO THE WINNIPEG RIVER



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EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1955



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Commissioners

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Report of the Commissioners on the Survey of the Boundary between the Provinces of Ontario and Manitoba from the Twelfth Base Line of the system of Dominion Lands Surveys to the Southern Shore of Hudson Bay and the Retracement and Restoration of the Boundary from the Northwest angle of the Lake of the Woods to the Winnipeg River.

Surveys by J. W. PIERCE, D.L.S., O.L.S., M.L.S., 1929, 1930 and 1937 and by
E. GAUER, D.L.S., M.L.S., 1947, 1948 and 1950.
Retracement by J. W. PIERCE, 1932.

Ontario-Manitoba Boundary
Commission
1955

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
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OTTAWA, FEBRUARY 4, 1955.

To THE HON. GEORGE PRUDHAM, M.P., MINISTER OF MINES AND TECHNICAL SURVEYS, OTTAWA, CANADA, THE HON. CLARE E. MAPLEDORAM, M.L.A., MINISTER OF LANDS AND FORESTS, TORONTO, ONTARIO, THE HON. CHARLES E. GREENLAY, M.L.A., MINISTER OF MINES AND NATURAL RESOURCES, WINNIPEG, MANITOBA.

Your Commissioners, R. Thistlethwaite, D.L.S., A.L.S., B.C.L.S., representing the Government of Canada, F. W. Beatty, D.L.S., O.L.S., representing the Government of Ontario, and H. E. Beresford, D.L.S., M.L.S., representing the Government of Manitoba, have the honour to make the following report on the survey of the Ontario-Manitoba boundary from the twelfth base line of the system of Dominion Lands Surveys to the southern shore of Hudson Bay during 1929, 1930, 1937, 1947, 1948, and 1950, and the retracement and restoration of the boundary from the northwest angle of the Lake of the Woods to the Winnipeg River during 1932.

Accompanying this report is an atlas of thirty-nine maps, one series No. 22 to 54, inclusive, covering the survey from the twelfth base line to Hudson Bay and another series, No. 1 to 6, inclusive, covering the retracement and restoration from Lake of the Woods to the Winnipeg River.

(Sgd.) R. THISTLETHWAITE,
 F. W. BEATTY,
 H. E. BERESFORD } *Commissioners.*

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CHAPTER I

REVIEW OF THE SURVEY, 1897 TO 1950

The survey of the Ontario-Manitoba boundary was carried out in six stages during the period 1897 to 1950, inclusive, each stage resulting primarily from the spread of mining activity into the neighbourhood of the legally defined boundary. The key legislative measures defining the Ontario-Manitoba boundary as it exists today were the Boundary Extension Acts of 1912 (16, 17, App. I) and their amendments in 1950 (38, 39, 40, App. I), these being based partly on earlier legislation in 1881 and 1889 (3, 4, App. I).

The survey of the last section of the boundary was completed in 1950, and in 1953 Ontario and Manitoba passed legislation accepting the boundary as marked on the ground from the twelfth base line to Hudson Bay (41, 42, App. I), which, together with their 1929 Acts (26, 27, App. I), completed acceptance of the entire interprovincial boundary from the Initial Point at Lake of the Woods to the Terminal Point at Hudson Bay. Confirming legislation was passed by Parliament in 1954 (43, App. I).

The boundary as surveyed is slightly more than $608\frac{1}{2}$ miles in length and, with the exception of a few thousand feet at the southern extremity, consists of three right lines. These lines are fixed by four points, namely: the original Initial Point at the northwest angle of Lake of the Woods; the centre of the road allowance on the twelfth base line of the Dominion Lands Surveys system—due north from the Initial Point; the most eastern point of Island Lake; and the Terminal Point, defined as the point where the 89th meridian of west longitude intersects the southern shore of Hudson Bay. The determination of these points was of great importance in the boundary survey.

The six stages of the survey were as follows:

1897-98—From the Initial Point due north to the Winnipeg River.

1921-22—From the Winnipeg River due north to the twelfth base line.

1929-30—From the twelfth base line northeasterly to Island Lake, and astronomic determination of the Island Lake and Hudson Bay points.

1937 —From Island Lake northeasterly to Echoing River.

1947-48—From Echoing River northeasterly to Hudson Bay.

1950 —Monumenting, etc., from Island Lake to Hudson Bay.

The 1921-22 survey is dealt with in the 1925 Report of the Commissioners. All subsequent surveys are described in the present report which, in addition, contains field reports of the 1897-98 survey and its 1932 retracement (App. III and Ch. III).

Each section of the boundary had to be projected through unmapped and little known territory and because of this the high degree of accuracy with which trial lines were surveyed was a source of great satisfaction to the Commissioners. During the 1929 survey the terminal point of the $87\frac{1}{2}$ -mile trial line from the twelfth base line to Island Lake struck within 5·1 feet of the objective, and in 1948 the terminal of the 282-mile trial line from Island Lake to Hudson Bay was only 15·8 feet perpendicularly distant northwesterly from the theoretical terminal. These deviations were so small that the trial lines were eventually accepted as parts of the true boundary and the considerable expense of re-survey was eliminated. The high accuracy and speed with which the trial lines were surveyed was in great part due to the cooperation of the Royal Canadian Air Force which took aerial photographs of the territory through which the defined boundary passed. These photographs made possible the preparation of aerial strip-maps to aid the surveyors in the field.

Even though the present report is concerned only with the boundary work from 1929 to 1950, inclusive, it is the final report on the Ontario-Manitoba boundary survey, and the Commissioners feel that a review of the various stages in the entire survey from 1897 to 1950 should be included in the first chapter. Such a review is particularly desirable because of the intermittent nature of the undertaking over a period of fifty-three years and the great number of Orders in Council and Acts which are directly related to the survey—both of these factors tending to obscure the sequence of events.

Brief descriptions of the various stages in the delimitation of the boundary during the 53 years from 1897 to 1950, follow.

1897-98 SURVEY, LAKE OF THE WOODS TO WINNIPEG RIVER

The line was surveyed due north from a point on the international boundary at the northwest corner of Lake of the Woods to the south side of the Winnipeg River, a distance of 58 miles (App. III). The survey was carried out jointly by E. Stewart, D.L.S., and B. J. Saunders, O.L.S., who were appointed in 1897 to represent the Dominion and Ontario, respectively, as Commissioners (11, 12, App. I). Manitoba declined the invitation to join in the survey on the grounds that the natural resources of the province were owned and administered by the Dominion (8, 6, 7, 9, 10, App. I).

The Dominion Government in 1898 invited the two provinces to pass legislation accepting that part of the boundary surveyed by Stewart and Saunders (13, App. I), and in 1899 Ontario passed an Act to that effect (14, App. I). Concurring legislation was not passed by Manitoba until 1929 when that province accepted the surveyed boundary up to the twelfth base line (27, App. I.). Dominion confirmation was not made until 1954 when the entire Ontario-Manitoba boundary as marked on the ground was confirmed by Act of Parliament (43, App. I.).

1921-22 SURVEYS, WINNIPEG RIVER TO TWELFTH BASE LINE

In 1912, the Ontario and Manitoba Boundary Extension Acts (16, 17, App. I) were passed by the Dominion, increasing the areas of the two provinces and re-defining the boundaries in principle, and, in connection with their common boundary, these Acts specified that the meridian section from Lake of the Woods to the Winnipeg River was to be extended due north to the twelfth base line and then northeasterly to Island Lake and Hudson Bay. Ontario and Manitoba assented to these Acts in 1912.

By 1921 the delimitation of the extended boundary was considered to be urgent by reason of mining developments in the Rice Lake district near the boundary, and in that year the Dominion invited Ontario and Manitoba to appoint Commissioners and join in the survey of the extended boundary (18, 19, App. I). Manitoba made no move to participate and in 1921 and 1922 the Dominion and Ontario surveyed 180 miles of the boundary from the Winnipeg River to the twelfth base line, each paying half the cost.

It is interesting to note that the Dominion Order in Council (19, App. I) did not name the commissioner but appointed him by virtue of his office as Surveyor General of Dominion Lands and that this precedent was thereafter followed in connection with the delimitation of the Ontario-Manitoba boundary.

1921 Season

The line was surveyed from the south side of the Winnipeg River due north to the Bloodvein River a distance of 69 miles. The work was done by J. W. Pierce, D.L.S., O.L.S., assisted by R. D. Davidson, D.L.S., under direction of Dr. E. Deville, Surveyor General of Dominion Lands, and L. V. Rorke, D.L.S., O.L.S., Director of Surveys for Ontario, the Commissioners appointed in 1921. (18, 19, App. I).

1922 Season

The line was surveyed from the Bloodvein River due north to the twelfth base line of the Dominion Lands Surveys system at Elliot Lake a distance of 111 miles. The surveyors and Commissioners were the same as in 1921.

In 1927, the Dominion invited Ontario and Manitoba to accept the line marked on the ground from Lake of the Woods to the twelfth base line (21, App. I) and in 1929 the two provinces passed the necessary legislation (26, 27, App. I).

It will be noted that in the 1929 Acts reference is made to the 1925 Treaty between the Dominion of Canada and the United States of America and that by this Treaty the most northerly point of the international boundary at the 'northwest angle of Lake of the Woods' was moved 72 chains and 50 links (4,785 feet) due south. This had the effect of extending the interprovincial boundary southerly the same distance. The exact location of the boundary between the old and new northwest angle points was not stated explicitly in the 1929 Acts,

and in order to prevent any misunderstanding the matter is referred to in Appendix IV. It is sufficient here to state that the interprovincial boundary between the old and the new northwest angle is not a due south line but the streamline of the Northwest Angle Inlet.

1929-30 SURVEYS, TWELFTH BASE LINE TO ISLAND LAKE

By 1929, the transfer of natural resources to the western provinces was being discussed and on May 30, 1930, the Manitoba Natural Resources Act was passed by the Dominion, confirming the transfer of the natural resources in Manitoba to that province. At the same time prospecting and the staking of mining claims in the neighbourhood of the legally defined Ontario-Manitoba boundary between the twelfth base line and Hudson Bay made establishment of this boundary on the ground urgent not only in relation to the staking of claims but as a basis for geological exploration and topographical mapping. Thus, at the invitation of the Dominion, Manitoba agreed to join with Ontario and the Dominion in the survey of that part of the boundary from the twelfth base line to the most eastern point of Island Lake (23-25, App. I). The latter point, known as "A", was a critical one and its determination on the ground was regarded as necessary before a trial line could be commenced.

1929 Season

The position of the most easterly point of Island Lake, designated as the Point "A", was determined astronomically, and a trial line was surveyed from the twelfth base line northeasterly to Point "A", a distance of $87\frac{1}{2}$ miles. The astronomical determination was made by C. H. Ney, D.L.S., and the trial line was surveyed by J. W. Pierce, D.L.S., O.L.S., M.L.S., assisted by E. F. Gorman, D.L.S. Both parties were under direction of the Commissioners: F. H. Peters, D.L.S., Surveyor General of Dominion Lands, appointed in 1925 (20, App. I); L. V. Rorke, D.L.S., O.L.S., Surveyor General of Ontario, appointed in 1921 (18, App. I); and G. A. Warrington, D.L.S., M.L.S., Surveyor, Department of Public Works, Manitoba, appointed in 1928 to represent Manitoba in the determination of Point "A" (24, App. I), and re-appointed in 1929 to represent the province in the survey from the twelfth base line to Island Lake (25, App. I).

The trial line struck within 5·1 feet (7·8 links) of the point established by C. H. Ney, which was so close that the Commissioners agreed to accept the trial line as the true boundary and its terminal point, 5·1 feet from Mr. Ney's determination, as the true Point "A". This point had such an important bearing on the exact location of the greater part of the boundary that it was considered advisable by the Commissioners to have its 1929 determination ratified by Order in Council. Consequently, in 1930 the Dominion and Manitoba passed Orders in Council accepting the terminal point of the trial line as Point "A" (29, 30, App. I), and in 1932 Ontario did the same (33, App. I). These Orders in Council

appear to have given sufficient assurance of mutual agreement to encourage the Commissioners to take further steps towards the completion of the boundary survey.

Just as the determination of Point "A" was considered essential to the line survey from the twelfth base line to Island Lake, so the determination of the Terminal Point at Hudson Bay was considered essential to the future survey of the trial line from Island Lake to Hudson Bay. For this reason, the Commissioners agreed that one of the primary objectives of the next season would be the astronomic determination of the Hudson Bay point.

1930 Season

Erection of permanent monuments, chaining, levelling, etc., on the 1929 trial line from the twelfth base line to Point "A" at Island Lake were carried out by J. W. Pierce. C. H. Ney made precise astronomic determination of the point where the 89th meridian of west longitude intersects the southern shore of Hudson Bay and he also made astronomic determinations of two intermediate points on the assumed line between Point "A" and the Hudson Bay terminal.

The intermediate points determined by Mr. Ney were not intended as points on the final boundary but as control points for the necessary aerial photography in connection with the future survey of the trial line from Island Lake to Hudson Bay. Because of this, they were located with less accuracy than the Island Lake and Hudson Bay points.

The points finally accepted as true boundary points at Island Lake and Hudson Bay were not the precise astronomic determinations by Mr. Ney in the 1929 and 1930 seasons but were the terminals of the trial lines surveyed from the twelfth base line to Island Lake in 1929 and from Island Lake to Hudson Bay in 1947 and 1948. These trial lines struck so close to Mr. Ney's precise determinations that their terminals were accepted by the two provinces and confirmed by the Dominion in 1950 when Acts (38, 39, 40, App. I) were passed amending the 1912 Boundary Extension Acts (16, 17, App. I). By these amendments the approximate locations of the Island Lake and Hudson Bay points, as defined in the original 1912 Acts, were made specific in terms of the terminals of the 1929 and 1948 trial lines.

THE 1932 RETRACEMENT SURVEY, TWELFTH BASE LINE TO LAKE OF THE WOODS

In 1932 Manitoba and Ontario agreed to restore that part of the inter-provincial boundary surveyed by Stewart and Saunders in 1897 from the north-west angle of Lake of the Woods to the Winnipeg River. The original line was difficult to find and many of the monuments were in bad condition. The Dominion took no part other than to loan a Dominion land surveyor.

Retracement of the boundary and restoration of monuments were made from the Winnipeg River south to the Initial Point at the northwest angle of Lake of the Woods, as the latter point was re-located by the 1925 Treaty with the United States of America. The survey was carried out by J. W. Pierce assisted by E. F. Gorman, D.L.S., on loan from the Dominion Government, and was under the direction of Commissioners S. E. McColl, D.L.S., M.L.S., Director of Surveys for Manitoba appointed in 1931 (31, 32, App. I), and L. V. Rorke, D.L.S., O.L.S., Surveyor General for Ontario since 1921 (18, App. I).

Although this retracement was not properly part of the boundary survey, it gave data supplementing the original records. The field report is given in Chapter III, and monument data in Appendix II.

1937 SURVEY, ISLAND LAKE TO ECHOING RIVER

In 1936, the Commissioners recommended that the survey from Island Lake to Hudson Bay be continued as soon as possible, particularly that part extending across the Laurentian Shield, a distance of about 110 miles. It was in this area, on both sides of and near to the legally defined border, that mining claims were being staked. An aerial reconnaissance strip map of this part of the boundary had been prepared because it was realized as far back as 1930 that no intelligent plan for the survey could be made without topographical information concerning the nature of the country and particularly of possible transportation routes. It was in connection with the preparation of such a map that the Commissioners had directed Mr. Ney to make astronomic determinations of two intermediate points in the 1930 survey.

The trial line was run from Point "A" at Island Lake northeasterly to Echoing River, a distance of 114 miles, by J. W. Pierce, D.L.S., O.L.S., M.L.S., assisted by E. Gauer, D.L.S., M.L.S. The survey was under the direction of Commissioners F. H. Peters, Surveyor General of Dominion Lands (20, App. I), C. H. Fullerton, D.L.S., O.L.S., Surveyor General of Ontario, appointed in 1935 (34, App. I), and S. E. McColl, Director of Surveys for Manitoba (32, App. I).

1947-48 SURVEY, ECHOING RIVER TO HUDSON BAY

By 1945, the Commissioners felt that it would be desirable to continue the survey of the boundary owing to expansion of activity in mineral claim locations. In this connection it was requested that the R.C.A.F. carry out aerial photography necessary to prepare an aerial strip map of the remainder of the boundary to Hudson Bay and this was completed by Sept., 1947.

The 1937 trial line was continued from Echoing River northeasterly to the point where the 89th meridian of west longitude intersects the southern shore of Hudson Bay, a distance of 168 miles. The work was carried out by E. Gauer, D.L.S., M.L.S., assisted by J. G. Pierce, O.L.S., and was under the direction of

Commissioners, F. H. Peters, Surveyor General of Dominion Lands (20, App. I), replaced in 1948 by B. W. Waugh, D.L.S. (37, App. I), F. W. Beatty, D.L.S., O.L.S., Surveyor General of Ontario, appointed in 1946 (36, App. I), and H. E. Beresford, D.L.S., M.L.S., Director of Surveys for Manitoba, appointed in 1941 (35, App. I).

The trial line intersected the coast of Hudson Bay at a point perpendicularly distant northwesterly only 15·8 feet from Mr. Ney's 1930 determination of the true intersection of the 89th meridian of west longitude with the southern coast of Hudson Bay. This was so close that the Commissioners recommended that the trial line and its terminal point be accepted as the true boundary. In 1950, the provinces of Manitoba and Ontario passed legislation (39, 40, App. I) consenting to Federal amendment (38, App. I) of the Boundary Extension Acts of 1912 (16, 17, App. I) to include as final the terminal points of both the Island Lake and Hudson Bay trial lines as these were surveyed in 1929 and in 1948, respectively. This made it possible for the Commissioners to complete the final marking of the boundary on the ground.

1950 SURVEY, MONUMENTING FROM ISLAND LAKE TO HUDSON BAY

Erection of permanent monuments, chaining, etc., along the surveyed line from Island Lake to Hudson Bay, a distance of 282 miles was carried out by D. E. Guard, M.L.S., under the direction of E. Gauer, D.L.S., M.L.S. The Commissioners were the same as in the 1947-48 survey.

CHAPTER II

METHODS OF SURVEY

The methods of survey used on the Ontario-Manitoba boundary survey from 1929 to 1950 were, with few differences, the same as those in the 1921-22 survey, described fully in Chapter III of the 1925 Report of the Commissioners. These methods were used also in Pierce's 1932 retrace of the original Stewart and Saunders survey from Lake of the Woods to the Winnipeg River in 1897. Thus the entire interprovincial boundary was surveyed in a uniform manner to a specified standard.

These methods were summarized by the Commissioners in their instructions to the surveyor prior to the 1929 survey, as follows:

"The production of the transit line and the astronomical work is to be carefully carried out according to the method prescribed in the Manual of Surveys for the survey of governing lines of the Dominion Lands System of Surveys, using for both purposes a six-inch micrometer block survey reiterating transit which has been previously tested at the Physical Testing Laboratory. Astronomical observations for azimuth are to be taken at such intervals as will insure a true alignment, and a series of at least three observations should be taken at each observing station.

"The true astronomical azimuth at each monument should be shown on the final plan and in the field notes as well as the initial azimuth of the line referred to the point of origin.

"The line is to be cut out so as to provide a six-foot sky line throughout and is to be blazed in accordance with the standards of legal survey lines as provided in the Manual of Surveys.

"You are to make two independent measurements of the line using the transit, tripod and weight method that was previously used. This measurement is to be protected against gross error by a check chainage made with a separate chain to the usual Dominion Lands survey subdivision standard.

"A line of levels should be carried along the boundary in accordance with the methods used in levelling along the base lines and meridians of the Dominion Lands Surveys System.

"Observations for magnetic declination are to be taken as frequently as possible throughout the survey, in accordance with Chapter 2 of the Supplement to the Manual.

"For the purpose of permanently marking the position of the boundary line, two forms of monuments will be used:

- (1) Concrete monoliths.
- (2) Special posts, either for rock or soil with the accompanying five foot stone mound or earth mound and four oits as the location may require.

"The interval between these monuments is to be as nearly as possible 100 chains with the concrete monoliths spaced at approximately six mile intervals. It is especially desired that all monuments be intervisible and that every care be taken in the selection of monument sites and in the construction of the monuments to insure their utmost permanency. All monuments will be numbered consecutively regardless of type, commencing with No. 220 at the first concrete post you will erect at your starting point at the Twelfth base line.

"It is desired that photographs be taken of all concrete monuments and of as many of the secondary monuments as is possible.

"In view of the fact that the direction of this part of the Boundary line is approximately northeast, all monuments, mounds, and pits are to be placed in the same relative position to the line as if said line were a meridian.

"In the event of provincial authorities wishing to associate small parties, such as geologists, with your survey for the purpose of utilizing your work as a base from which to extend their investigations, you are authorized to make your own arrangements with them for such board or other accommodation as is necessary and to assist them in every way possible, providing that such assistance does not unduly interfere with your own operations.

"So far as circumstances will permit, you are to collect and include in your report all available information of importance with respect to the natural resources of the district through which your line passes. Suitable entries are to be made in your records regarding classes and depths of soils and subsoils. Notes should be recorded respecting forest cover, timber and pulpwoods, water powers, water routes, agricultural areas, minerals, game, fish and climatic conditions, in order that the records of the survey may be as complete as possible."

"The final returns of your survey will consist of:—

- Plan,
- Field notes,
- General report,
- Azimuth observations,
- Magnetic observations,
- Level returns,
- Oaths of chainmen,
- Accounts and vouchers."

The few differences in the later surveys, in relation to the 1921-22 standard, were more general in nature and were adopted primarily to overcome the difficulties and time delays normal to accurate delimitation of lines in unmapped, northern territory. These included the use of the winter season only, radio communication, transportation by aircraft, and strip maps based on aerial photographs of the line to be surveyed. As the surveys progressed northward into relatively flat country, it was possible to simplify the chaining methods,

and in the later surveys to dispense with the process of carrying spirit levels. In the photographic and air transport work, the Royal Canadian Air Force played a vital part. More detail on these matters is given in Chapter III.

The survey of the long stretch of boundary from Island Lake to Hudson Bay presented an unusual problem that called for special astronomic determinations in its solution, as described in the following section.

ASTRONOMIC DETERMINATIONS, 1929-30

Two critical points on the Ontario-Manitoba boundary were defined by the Boundary Extension Acts of 1912 (16, 17, App. I), namely, the most eastern point of Island Lake and the Terminal Point where the 89th meridian of west longitude intersects the southern shore of Hudson Bay.

In the 1929 season C. H. Ney, acting for the Commissioners, determined the most eastern point of Island Lake as a necessary preliminary to Pierce's survey of the trial line from the twelfth base line to Island Lake in the same season. The terminal point of the trial line came within 5·1 feet of Ney's point and, in order to eliminate the cost of a re-survey, the Commissioners agreed to accept this terminal as the true boundary point, designating it as Point "A". In the 1930 season, Mr. Ney determined the Hudson Bay point.

Knowledge of the longitude and latitude of these two points was essential to the eventual survey of the trial line from Island Lake to Hudson Bay. The data obtained were:

	Longitude	Latitude
Point "A" at Island Lake.....	53°44' 19".42	93°39' 14".91
Terminal Point at Hudson Bay.....	53°50' 26".73	80°09' 00".00

Owing to the variations from place to place in the deflection of the plumb line vertical from the normal to the spheroid, it might be expected that the astronomic positions would not give the true geodetic relationship of the two points. Nevertheless they were the only data available from which to determine the azimuth of the right line joining them.

Using the above values and the formulae given in Clarke's "Geodesy" with his 1866 spheroid, the initial azimuth at Island Lake of the required trial line was calculated to be 38°40'33".70 and its length, 454,440·3 metres, or 282·375 miles.

With these data, the longitude, latitude, and the azimuth of the line were calculated for intermediate points at 50-mile and at 5-mile intervals. By interpolation, a table was prepared giving the latitude, longitude, and azimuth of the right line at one-mile intervals from Island Lake to Hudson Bay.

In the 1930 season Mr. Ney also made astronomic determinations of two points on the assumed boundary, intermediate between Island Lake and Hudson Bay. These were selected near distinctive landmarks that could be readily recognized from the air. Their purposes were to provide control for aerial

photography in the immediate vicinity and to facilitate aerial photography over the whole of the legally defined boundary from Island Lake to Hudson Bay. This line crossed a country known only to Indians and an occasional white trapper and it was felt by the Commissioners that no intelligent plan of its future survey could be made without detailed knowledge of the topography, such as could be derived from aerial photographs. The field work was done in the 1930 season and is described in Chapter III.

Several developments in methods of survey are brought into relief by Mr. Ney's reports, two being of particular interest: first, the high accuracy with which points on the earth's surface can be located by astronomic observation based on radio time signals; and second, the time and energy saved by the use of aircraft. The latter is too obvious for further comment but more might be said concerning the use of radio time signals.

Longitude is determined by comparing the local sidereal time with the time at some point of known longitude. Using radio time signals, the latter can be determined to within 1/100 of a second. At the Hudson Bay end of the boundary, 1 second (time) represents 856 feet. It follows that the 89th meridian of astronomic longitude can be located on the ground to within 8 to 10 feet. Latitude may be determined with the same accuracy. Consequently, if there is no differential between the geodetic and astronomic spheroid co-ordinates, measurements on the ground should agree with the astronomic determinations.

Such accuracy has been possible for only a few years. As recently as 1917, when the 120th meridian was located by the British Columbia-Alberta Boundary Commission, radio time signals for the use of surveyors had not been developed and the observation point for longitude had to be located close to a station in telegraphic communication with Ottawa.

CHAPTER III

CONDENSED REPORTS OF SURVEYS

1929 TO 1950

1929 SEASON

The program for this season was to survey a trial line along the legally defined boundary from the twelfth base line to Island Lake, in accordance with the Boundary Extension Acts of 1912 (16, 17, App. I). J. W. Pierce was assigned to this work. To do it correctly he had to be given the direction of the line, which depended on a precise astronomic observation of the most eastern point of Island Lake, referred to by the Commissioners as Point "A". The first undertaking of the season, therefore, was the determination of this point.



THE MOST EASTERN END OF ISLAND LAKE

The temporary post planted at the most eastern end of the lake by Mr. Ney in 1929.

The closing between Mr. Ney's post and the end of the trial line, indicated by the line picket a few feet to the west.

Determination of Point "A" by C. H. Ney

On June 4, 1929, Ney and Pierce left Selkirk on the first boat of the season bound for Norway House. This gave them an opportunity to check their plans.

Mr. Pierce with his party disembarked at George's Island to make his way to the starting point of the trial line at the twelfth base line. Mr. Ney arrived at Norway House on June 7 and after two unsuccessful attempts owing to bad weather, reached Island Lake on June 11 in an R.C.A.F. Vickers Viking plane.

He gave much consideration to the selection of Point "A", and then built a concrete pier on a rocky outcrop about 300 feet away as a base for the astronomic telescope. Following is an extract from his report:

"A value of the longitude was made on each of three nights taking time sets of about 12 or 14 stars observed both direct and reversed by means of the travelling transit micrometer. Radio time signals for Greenwich time were received at 9 p.m. and 2 a.m. central time from the Washington Naval Observatory, through Arlington, using the vernier clock system of reception. A short-wave radio receiving set was used for this purpose throughout this operation and the remainder of the season on the coast of Hudson Bay with perfect satisfaction.

"The latitude was determined by Talcott's method taking pairs of stars transiting north and south of the zenith. The results of observations were worked out from day to day and the means taken as the position of the pier; the longitude however being subject to a small correction due to errors at Arlington in broadcasting the radio time signals."

This observation pier was connected to the post planted at Point "A"—the target at which Mr. Pierce, some 90 miles away, had to aim. Owing to storm damage to the plane, Mr. Ney was not able to convey the results to Mr. Pierce until July 2.

Survey of Trial Line by J. W. Pierce

It has already been related how Pierce left the boat at George's Island on June 6 to travel to his starting point on the twelfth base line. The route followed was up Poplar River through Weaver and Wrong Lakes to the junction with Assapan River, then up this river to the junction with Meandrine River. At the first lake on Meandrine River the route left the river and went northerly across a height of land, through several small lakes which finally led into an arm of Charron Lake, and from Charron Lake down Palsen River into Elliot Lake where a camp was established near the twelfth base line on June 25.

The journey, which was approximately 120 miles, took 17 days and was made difficult by 44 portages and low water conditions in the rivers. In his report, Mr. Pierce states that the route had never been used before by any but Indians.

On arrival at Elliot Lake, Pierce visited the end of the line surveyed in 1922. The monuments which had been erected were in perfect condition and the line presented much the same appearance as it had when opened seven years previously. E. Gauer had an opposite experience at Echoing River in 1948 when a line run in 1937 was difficult to find.

The survey from the twelfth base line was commenced on June 26 and a temporary post on the meridian was established at the centre of the road allowance at the base line. From this point the trial boundary line was run on an assumed

azimuth of $44^{\circ}25'50''$ until the time when C. H. Ney would arrive with correct azimuth. On July 2, Mr. Ney flew from Norway House and gave Mr. Pierce the information, returning to Norway House the same day.

About 11 miles of the 87-mile trial line had been run before Mr. Ney's arrival but bad weather had prevented accurate azimuth observations. When the weather improved and satisfactory observations were taken it was found, however, that the azimuth of the trial line was so close to the theoretical one that no deflection was deemed advisable and it was produced to Island Lake without change.

The method of surveying the line was identical to the method used on the survey of the meridian section of the boundary—fully described in the Report of the Commissioners in 1925—with the exception of the chaining, which was by ordinary rather than precise methods, this being considered satisfactory under the circumstances.



TRANSPORTATION BY WATER

Some of the difficulties of travel on the Poplar, Palsen, and Banksian Rivers during the 1929 season.

The problem of transportation along this section of the line was to a great extent solved by the use of an excellent aerial map of the district. As a result, very little exploration for routes was necessary and movement of personnel and material could be planned well in advance.

No permanent monuments were placed on the trial line but copious notes were taken regarding the installation and sites for permanent monuments to be erected on the true line.

On September 6, the trial line struck 7·8 links (5·1 feet) northwest of Mr. Ney's post. This excellent result was a matter of satisfaction to the Commissioners.

Excellent results were obtained also in measuring the length of the line which, from Ney's observations, was computed as 87 miles 56·254 chains. The length as measured was just 60 links (39·6 feet) longer. Taking into account the type of country, the $87\frac{1}{2}$ -mile line was surveyed in remarkably good time. It was commenced on June 26 and completed by September 6.

After running the line, J. W. Pierce examined the east end of Island Lake and made a special report in which he confirmed C. H. Ney's selection of the Point "A".



THE TRIAL LINE NEAR ISLAND LAKE.
View northeasterly, five miles from the east end of the lake.

The party made its way to the Hudson's Bay post at the western end of Island Lake, then by the trade route to Norway House where the steamer was boarded for Winnipeg.

Pierce's report concludes with a warm tribute to the services rendered by his assistants, E. F. Gorman and Wm. Hayward, who were responsible for the production of the line.

After examining the reports and maps, the Commissioners agreed to accept the terminal point of the trial line as Point "A" and further agreed to accept the trial line as the actual boundary. Owing to the importance of Point "A", it was considered advisable to submit the Commissioners decision for confirmation by

Order in Council. The decision to accept Point "A" was confirmed by Dominion and Manitoba Orders in Council in 1930 and by Ontario Order in Council in 1932 (29, 30, 33, App. I.).

1930 SEASON

For this season, the Commissioners decided to carry out the final monumenting, levelling, etc., of the trial line surveyed in 1929, having accepted it as the true boundary. Another objective for the season, in preparation for the future survey of the remainder of the boundary from Island Lake to Hudson Bay, was the precise determination of the Terminal Point at Hudson Bay and the less precise determinations of two intermediate points to act as controls for aerial photography. The field work in connection with these projects is described below.



TYPICAL MONUMENTS ERECTED IN 1930.

Concrete monument 240, 23 miles from the
twelfth base line. View northeasterly.

Stone mound monument 242, 25 miles from the
twelfth base line. View southwesterly.

Final Delimitation of the 1929 Line by J. W. Pierce

The Commissioners' instructions were that the true line must conform to the standards set down for that portion of the boundary surveyed in 1921 and 1922 and described fully in the 1925 Report of the Commissioners. Most of these standards having been complied with in the survey of the trial line in 1929, Pierce, with the Commission's consent, confined his activities to those features of the survey not up to the required standard. The route followed to and from the work was the same as in 1929.

The accomplishment of the assignment entailed the following, from June 18 to September 1:

Erection of 76 intervisible monuments from Monument No. 220 on the twelfth base line to Monument No. 295, Point "A", Island Lake.

Line of levels using monuments as bench marks.

Observations for magnetic declination at each monument.

Precise chainage over the whole line.

When this work was done the remaining three weeks of the season were used in surveying about 30 miles of the boundary northeast from Island Lake. At the same time J. W. Pierce, with Indian help, carried out a stadia traverse of canoe routes which might be used when the Island Lake to Hudson Bay part of the boundary was run. Much valuable information was gained. Throughout the 1930 survey two geologists were attached to the party, one representing Ontario, and the other Manitoba.

Astronomic Observations by C. H. Ney

Owing to lack of air transportation Ney was forced to deal with the two intermediate points before determining the Terminal Point. To carry out the work, he left Ottawa on May 28, 1930, with one assistant and after a few days of preparation in Winnipeg continued his journey, reaching Norway House on June 8, where equipment, supplies and remaining personnel had arrived by boat. The ensuing week was spent in moving equipment, etc., by air to Gods Lake and establishing a base there.

On June 16 the survey began with a search for the first intermediate point. A preliminary flight was made over a 20-mile base line between recognizable topographic features in the mapped area around Gods Lake base to determine the ground speed and wind. This done, the plane, with J. C. Uhlman as pilot, Mr. Ney as navigator, and K. J. Regan as air mechanic, flew into the unmapped territory of northeastern Manitoba.

Near noon when the computation of distance and direction showed the plane to be 15 miles from the objective a group of lakes came into view. When the required mileage was completed the plane was over one of these lakes, known to Indians as Black Duck Lake, and a landing was made. A solar observation for geographic position was taken and the plane returned to Gods Lake base. Calculation showed that the point was 222.42 chains (less than three miles) from the assumed boundary.

On June 17 a camp was established on Black Duck Lake and about a week was spent in triangulating to several prominent points and in observing on the stars from a point about one mile from the assumed line. In addition, a series of aerial photographs was taken covering an area 10 miles square about the point of observation.

The topography shown on these photographs, plotted with reference to the observation station and triangulation control, depicts with considerable accuracy a cluster of five lakes unknown before 1930. The lakes are from 6 to 12 miles long, separated only by a few miles. On a map of the area, the assumed and true boundaries can be drawn and the position of either line identified from the ground or the air by reference to this distinctive cluster of lakes.

Mr. Ney next established the second intermediate point about 200 miles northeast of Gods Lake. Progress was delayed for about ten days by the withdrawal of the original aircraft and the substitution of two not so well adapted to the work, one of which proved to be of little or no value. On summing up the situation, Ney found that only one trip to the remote objective could be made and this could be done only by enlisting the pilot as technical assistant to eliminate the weight of the regular assistant, and by cutting the rations to three days' supply. The plane was fuelled from a cache at Black Duck Lake and additional drums of gasoline were loaded. The flight was made on July 8. From Black Duck Lake the plane followed the line of the assumed boundary over a section of country as little known as the remote parts of the Arctic coast. It landed near the southern end of Sturgeon Lake.

An approximate sun observation showed the point of landing to be in Ontario about 13 miles from the assumed boundary. Accordingly, a second landing was made at a prominent point about 5 miles from the northern end of the lake. A station was established, extensive observations were made, and a triangulation was extended to the extreme northerly end of the lake where Shamattawa River begins its course to Hayes River and Hudson Bay.

The final station of the triangulation was later calculated to be about 3 miles from the assumed boundary. The triangulation stations were considered sufficient to provide adequate control for the plotting of photographs of the local area whereby the position of the true boundary could be shown with fair accuracy. As more food, more assistance, and a canoe would have been needed to do further work, the return trip to Gods Lake was made on July 11.

The plane was not equipped to take aerial photographs. However, the photography was done later by P/O Kennedy, R.C.A.F. Mr. Ney was unable to accompany him owing to the lateness of the season and the necessity of establishing Point "B" at Hudson Bay.

Being unable to get air transport to Hudson Bay, Ney had to travel a circuitous route as follows:

By air, Gods Lake to Cormorant Lake;

By rail to Mile 352 on the Hudson Bay Railway;

By canoe down Nelson River to Port Nelson;

Storm bound for three days at Port Nelson, Mr. Ney did not reach York Factory until August 1.

At this point a special 22-foot freight canoe was obtained from the Hudson's Bay Company and was manned by local Indians who knew the coast. This craft carried the heaviest portion of the equipment and the remainder was loaded into Ney's 20-foot freight canoe. Each craft was propelled by an outboard motor.

On the morning of August 2, at 4 a.m., the 160-mile trip down the coast was begun. Five days later it was estimated that the objective, the 89th meridian of west longitude, had been reached. A landing was made at 6 p.m. and the next day preliminary observations disclosed that the 89th meridian was within a mile of the observation point.



TRANSPORTATION BY WATER.

Mr. Ney's party stranded on the flats, waiting for the tide. Hudson Bay, 1930.

The difficulties encountered on the journey can be best illustrated by a quotation from Mr. Ney's report, as follows:

"Travel on the west coast of Hudson Bay is a strenuous undertaking even in good weather. Due to the prevalence of extensive shoals, the tide at low water leaves bare to seaward several miles of sand or mud flats, in places studded with huge boulders. At such stages of the tide it is impossible to leave or approach the shore in boats. Consequently on an extended trip along the coast, the voyageurs must plan to catch the early morning or night tide. Launching the boats just before high water, it is necessary to move quickly out to sea from two to five miles to avoid being stranded as the tide goes out. With this much offing, it is usually safe to proceed along the coast, keeping a sharp lookout at all times for large boulders or shoals."

"Due to the low elevation of the immediate coast, it is often impossible in hazy weather to see the shore at this distance. Consequently when travelling with outboard motors, it is advisable to run entirely on compass bearings. A day's journey, once commenced in this manner at dead of night or in the early morning hours cannot be ended at will. Until the tide comes in about eleven and a half hours from the time of high water, the traveller must stick to his ship in fair weather or foul. It is for this reason that travel in small craft is not considered extremely safe along this coast. Should a sudden storm blow up, so bad as to threaten disaster, a landing can usually be made through the surf, although boats and cargoes are generally sacrificed."



AT THE BOUNDARY TERMINAL IN 1930

The observation pier, one-half mile from the theoretical terminal.

Mr. Ney's boundary terminal monument, used in the 1947-48 season as the target of the trial line.

Since the preliminary observations indicated that the landing point was less than one mile from the objective, it was not necessary to move camp. Accordingly, a concrete pier, 12" X 24" X 30", was built on a ridge and numerous observations were taken for latitude and longitude. The observation for longitude could not be computed exactly because it depended upon corrections to the time signals from Washington Naval Observatory, which were not available.

Before these corrections were applied it was deduced that the 89th meridian lay 2,720·4 feet east of the pier. This distance was measured and a meridian was run northward a few hundred feet to intersect the coast line where a 10" \times 10" \times 48" concrete monument was built. As an aid to locating the monument, a 15-foot beacon was constructed on the site.

When the position of this monument was calculated later, and all corrections applied, the latitude was found to be 56°50'26"73 and the longitude, 88°59'59"10. It is to be noted that the legally defined boundary terminal, in longitude 89°00'00", lay 50·0 feet due west of the monument erected by Mr. Ney. The final legal terminal based on the survey of the trial line in 1948 was perpendicularly distant northwesterly 15·8 feet.

After mapping the adjoining coast line in the vicinity of the boundary Mr. Ney returned to York Factory. This concluded his work for the Commission.

1932 RETRACEMENT SURVEY

For some time prior to 1932 it had been apparent that the section of the boundary surveyed in 1897 from the northwest angle of Lake of the Woods to the Winnipeg River required restoration. It was difficult to find, and many of the monuments were in poor condition. The boundary Commissioners for Manitoba and Ontario felt that only a complete retracement of the original line would enable the discovery of all the old monuments and provide a check on chainage and azimuth. In due course, the two provinces agreed to undertake the retracement in 1932.

The Dominion did not participate in the work since restoration of a legally defined interprovincial boundary is purely a provincial responsibility. Although this retracement cannot be considered part of the boundary survey proper, a summary of the work is included in the present report of the boundary Commissioners because it provided data which supplemented the original records.

The retracement was made southerly from Monument No. 82 on the south bank of the Winnipeg River to the intersection with the international boundary at the northwest angle of Lake of the Woods, a distance of slightly more than 59 miles. A connection was made from the old Monument No. 1 at the original northwest angle of Lake of the Woods to Monument T.P. 1 marking the new northwest angle as the latter was defined by the Treaty of 1925 (App. IV). T.P. 1 is 4,785 feet due south of Monument No. 1 and the boundary between the two is the stream line. This work was carried out between June 28 and September 20 by J. W. Pierce, D.L.S., M.L.S., O.L.S., assisted by E. F. Gorman, D.L.S., who was on loan from the Dominion, and it was under the direction of the boundary Commissioners for Manitoba and Ontario, S. E. McColl, D.L.S., M.I.S., and L. V. Rorke, D.L.S., O.L.S., respectively.

The following extracts are from Mr. Pierce's report of the 1932 retracement survey.

"The visible evidences of the former line, which had been surveyed thirty-five years ago in 1897, varied greatly as a result of the changes that had taken place in the condition of the forest cover during the interval. According to the original field notes, the line had then passed through large areas of burned country. Some of these areas have grown up since, but in nearly all cases, there was here little superficial evidence of the old line. The stumps had so rotted that they could not be distinguished as line stumps until after the line had been opened and a sequence of these decayed stumps disclosed. Where the original timber was standing and particularly so in the swamps, the line was readily discernable,"

"In the resurvey of this line it was considered essential for purposes of azimuth to survey the trial line in as few courses as possible and to determine the actual directions between the adjacent original monuments by the amount of their offset distance from the trial line. With this in view the trial line was produced southerly from Monument No. 82 with the base line transit through a sky line opening averaging ten feet in width which had first been cleared out with the use of the small transit. Usually the trial line was found to diverge more or less continuously from the line of original posts which were thus disclosed. As the line between the original posts approached the side of this opening, the trial line was bodily offset usually by about five links, by moving two of the main stations over by the amount of the offset and the line was produced from these new stations. This involved no change in the azimuth of the trial line. This practice was continued through to the end of the line and it was only once found necessary to deflect the trial line. The amount of this deflection was determined by measured offsets from a straight line, rather than by angular measurement. The northern eleven miles of trial line was surveyed on a course of $180^{\circ}00'14''$, this being determined from the results of six azimuth observations made at three stations along this section. The balance of the line of about forty-eight miles in extent was surveyed on a course of $179^{\circ}59'26''$. A series of twenty-six azimuth observations were made along this section at ten different stations. From the bearings of these courses and from the offsets to the original posts, the bearings of the various courses of the original line have been deduced and have been entered on the plans and in the field notes of this retracement and restoration survey.

"An examination of the courses between the original monuments indicates an oscillation in the line averaging possibly as much as one minute of arc From a computation of the azimuths of the two courses of the trial line and of the offsets between its various sections it would appear that the longitude of Monument No. 82 is about 66 links west of the southern end of the line.

"Of the 82 monuments which had been placed along this line, sufficient evidence was found on the ground to permit of the restoration of all but two In all other cases, wooden posts were made and marked with the marks that had

appeared on the original post in addition to the number of the monument A mound of stones considerably more substantial than what had been used before, was finally built around the monument."

"The monumenting along the line was found to be of a high order, the posts had been well made, marked and planted, and while they would not all have been found without considerable difficulty, had not the entire line been retraced, the fact that 80 out of 82 monuments were found 35 years after they had been placed with so little difficulty, is evidence of the care with which this part of the survey had been made.

"Standard boundary concrete monuments and rock posts with stone mounds were placed in suitable positions on intervisible summits averaging, as nearly as possible 100 chains apart. The location of these monuments and the details of their construction is identical with the procedure elsewhere along this boundary. Care was taken to place these auxiliary monuments exactly on the line between the adjacent original monuments. It follows therefore* that the line between two successive auxiliary monuments will seldom pass through the intervening original monuments. In order that these monuments may be distinguished from the original monuments, they have been marked with the distinctive number of the original monument immediately to the south followed by the letter A, or B, if there were two permanent monuments in the interval between two successive original monuments."

"A connection was made between Monument No. 1 which was found in good condition 25 chains north of the former North West Angle, and the present position of the North West Angle, which is indicated on the International Boundary maps as T.P. 1. This point, which is in the water, is referenced by two steel obelisks set in concrete, indicated as Reference Monuments Numbers 1 and 2, easterly and westerly 465·1 and 386·6 meters respectively from T.P. 1. Both of these reference points were connected with and the position, length and direction of the line connecting Monument No. 1 with T.P. 1 was computed. This line passes over an open hay slough, which at the time of survey was nearly all under water"†

"The tripod and weight apparatus method of chaining with a check chainage by the use of ordinary methods was used throughout this survey. We were fortunate in having two chainmen, both of whom were extremely careful and painstaking in the execution of this important duty. As might be expected, there was some trouble at the commencement in getting this work to check out properly in the field and the chainmen were engaged during some of the first Sundays in the remeasurement of some of the lines. A comparison between the original distances along this line and those of the resurvey would indicate that the former chainage is the weakest feature of an otherwise well executed survey.

* Commissioners' note: because of the slight deflections east or west in the courses between the original monuments,

† Commissioners' note: the boundary line between Mon. No. 1 and Mon. T.P.1 is the stream line. For more details on this point see App. IV.

If these chainages are compared with the profile of the line, which appears opposite to them on the map sheets, an explanation of some of the discrepancies is apparent.

"It should be remembered also, that the chainmen of thirty-five years ago had not the facilities afforded by the long chains and accurate methods of the determination of slopes that were used on this survey. It will appear that in the moderately level country, the difference in the length of a mile was often not serious, though it was nearly always one way in direction. In the rougher sections, the differences are noticeably greater and more erratic, so that in the total distance of slightly over 59 miles the recent chainage is about 6.71 chains less than that of the original chainage. This averages nearly ten links to the mile."

"Many of the water areas intersected by the line presented unusual problems in the obtaining of proper triangles with apex angles of 30 degrees. The aerial photographs were of great assistance in working out the somewhat complicated sets of triangles that were used."

1937 SEASON

The purpose of the field work in 1937 was to survey the boundary line from the east end of Island Lake northeasterly to Echoing River. This was carried out by J. W. Pierce, assisted by E. Gauer.

The survey differed from the previous surveys dealt with in this report in two striking respects: the use of air transportation, and winter work.

Air Transportation

In the eight years since the boundary line was surveyed to Island Lake the use of the aeroplane for transportation of supplies and personnel on other field surveys had increased efficiency and lessened the hardships characteristic of such work.

The decision to use air transportation in the 1937 survey was based on the strong recommendation of S. E. McColl, one of the Commissioners at the time and Director of Surveys for Manitoba. Under his direction, base and meridian lines in the Island Lake and Gods Lake regions of Manitoba had been surveyed in winter, using planes. The field work for these surveys had been in charge of D. N. Sharpe, M.L.S.

The alternative to the use of planes was transportation by dog team, and D. N. Sharpe's comparative figures on costs were convincingly in favour of the use of air transportation.

Plane transportation makes possible a comfortable camp and a normal diet. The value of these factors cannot be over-emphasized. Refreshed by a good night's rest and with a good breakfast, all members of the party are in condition to

carry out with care and accuracy the precise observations and measurements required. At night, observations and measurements must be reduced, checked, and re-checked, and the next day's work must be planned. The better the living conditions, the better and more quickly this work will be done.



TRANSPORTATION BY AIR
Moving camp equipment during the 1937 survey.

WINTER CAMP

Camp No. 8 on the 1937 trial line at Stull Lake, 65 miles from Island Lake.

The results of the 1937 survey fully justified the use of aeroplanes; little time was lost in the initial move of transporting men and supplies from Lac Du Bonnet to Island Lake and practically all the remaining period was devoted to surveying the 114-mile line, which was opened in record time. Only on two occasions did planes fail to carry out pre-arranged plans to move the survey camp as the line advanced.

Winter Work

There are two particulars in which winter work compares unfavourably with that done in the summer, namely, monumenting and obtaining general geographical information.



WINTER MONUMENTING

Thawing the rock before setting the post in place., Mon. 311 near Robson Lake, 29 miles from Island Lake. Survey of 1937.

An extract from J. W. Pierce's 1937 report describes the difficulties of winter monumenting:

"Monumenting original surveys in winter is the most troublesome and least satisfactory of any of the survey operations. Through wooded country, bearing trees add greatly to the readiness of finding monuments, but over extensive distances towards the end of this survey desirable trees were not to be found. A great deal of the dry timber had already fallen while the uplands and large areas of former swamp land are reforesting with jack pine. The tops of these were just now appearing above the snow and it will only be a few years until this growth will have filled in and obscured all evidence of the line. The monuments are going to be difficult to locate".

The accuracy of this statement is borne out by the fact that E. Gauer, in 1948, had difficulty in finding the line at Echoing River.

The gathering of general geographical information concerning the area under survey has always been a traditional secondary duty of the surveyor and the information gained has in the past been invaluable to the forester, the geologist, and others. It has been found that the combination of air transportation and winter work has made the gathering of such information difficult. In the 1937 survey, for instance, there was no opportunity of visiting the various native centres, trading posts, or mining camps, or of meeting the residents of the district. The snow made it difficult to determine much about rock outcrops or other topographical features.

Although this objection to winter work was valid in earlier days, the modern use of aerial photography in connection with surveys has altered the picture and much of the information formerly provided by the surveyor can now be derived from aerial photographs, especially in regard to topographical features. The line from Island Lake to Hudson Bay was covered by aerial photography and a study of the photographs will furnish valuable and accurate information concerning the nature of the country.



LINE PRODUCTION
Axemen at the head of the trial line near Mile 109. Survey of 1937.

Detail of the Survey

The first members of the party were flown to Island Lake on January 4, 1937, and four days later the survey commenced. Owing to bad weather, the remaining personnel and supplies did not arrive until January 11. From then

until March 18 work on the line was practically continuous and the 114 miles to Echoing River were completed. On March 20, all work finished, most of the party ate lunch in camp and dinner 350 miles away in Winnipeg.

Sixty-one monuments were erected, No. 295 at the Island Lake point having been placed in 1930. No. 356, at Echoing River, marked the end of the season's work.

The methods of line production and chaining were the same as on previous surveys and need no further description. The only difference between the winter and the summer surveys was that it was necessary in the former to provide the chainmen with extra help on account of the speed with which the line was produced. Since the daily periods of good light are short in winter, the first assistant was employed most of the time in producing the accurate line with the base line transit. A second transit man was employed to project the preliminary line, make observations for magnetic declination, and give assistance to the chainmen.

Spirit levels were not run over this part of the line. The profile was plotted from vertical angles read forward and backward with the second transit and checked with the base line transit. On checking the levels at the eighteenth base line, a discrepancy of approximately five feet was found.

The good results attained on this survey would not have been possible without the advance map which had been prepared from aerial photographs. Although the boundary line projected on this map deviated in many places from that opened on the ground, the measured and map distances from Island Lake to Echoing River were in practical agreement.

1947-48 SEASON

In the winter of 1947-48 the last 168 miles of the Ontario-Manitoba boundary from Echoing River to Hudson Bay, were surveyed. This was done by E. Gauer and his assistant, J. G. Pierce, son of J. W. Pierce who had been in charge of earlier surveys in connection with the boundary.

Ample time was available for the organization of the survey, because the Commissioners had agreed in February, 1947, that the work be carried out the following winter. A strip map of the whole line was prepared from aerial photographs and, as early as July, search for experienced personnel was commenced and arrangements were made for dog teams and a supply of fish.

The following account deals with the main features of E. Gauer's report.

Dog Team Transportation

From Echoing River to Sturgeon River, a distance of about 40 miles, there were no suitable places for plane landings, so dog teams were used for transportation. Five teams, five drivers and a trail breaker were obtained from Shamattawa Indian Settlement.

The difficulties and vexations met with in using dogs may be said to have begun before the teams appeared on the scene. Delay in their arrival made it necessary to resort to fly camping which retarded work and did not improve morale. On January 4, the dog teams at last arrived in camp. When the work was explained and the rate of pay confirmed the drivers announced that they were going home in the morning. Promised a rest for their dogs, and being given a good meal, they decided to stay.

To maintain line progress, these dog drivers worked seven days a week, camp equipment was cut to a minimum, and non-essential equipment was left at the landing strips, previously located as air supply bases.

The use of dog teams entails extra work and trouble such as providing feed for the dogs, carrying out repairs to toboggans, and in some circumstances using an interpreter. On this survey, further difficulties arose in persuading the Indian drivers to stay on the job.



TRANSPORTATION BY DOG TEAM AND AIRCRAFT
Dog teams taking over from an aeroplane on the 1947-48 survey

Inspection Visit of Commissioners

Messrs. H. E. Beresford and F. W. Beatty, Manitoba and Ontario Commissioners, respectively, flew from Lac du Bonnet, arriving in camp on March 15. They were accompanied by R. Frederickson, photographer, and C. B. Gill,

forestry engineer, both of the Manitoba Mines and Natural Resources Department. The Commissioners remained for five days and inspected all phases of the work.

A flight along the line was attempted but bad flying conditions made it impossible to reach Hudson Bay.

Monumenting

Most of the monuments consisted of a short rock post cemented to the top of a $1\frac{1}{2}$ -inch pipe, 48 inches long, which was driven into the ground. The posts were referenced by bearing-trees and stumps most likely to survive.

An unusual feature of this survey was the absence of boulders on all summits. When D. E. Guard visited the line in 1950 to erect concrete monuments he had no difficulty in finding the temporary ones.

Levelling

As in the 1937 survey, elevations along the line were obtained by reading vertical angles between stations, both forward and backward.

To conform with an approximate sea level assumed at Hudson Bay, the elevations required an adjustment of 15·8 feet, but the degree of accuracy of any one elevation is difficult to assess.

Progress of the Work

Line cutting began at Mile 114 (Mon. No. 356) on December 24, 1947, and was completed at Hudson Bay, Mile 282 (Mon. No. 457A), on April 6, 1948, a distance of 168 miles. Miles surveyed in each month were:

January.....	41
February.....	47
March.....	68
April.....	12

The 68 miles surveyed in March constitute a record for that month on comparable surveys. This was owing to the extensive use of aircraft and to the lighter forest cover as the line approached Hudson Bay, but some credit must also be given to the muskrat; high prices were quoted for pelts that year and the Indian axemen were eager to get through in time to share in the harvest.

Results of the Season's Work

The line as surveyed was aimed at a point on the coast 50 feet west of C. H. Ney's 1930 monument. Though the strip map gave assurance that the line was not subject to any grave error it did not permit an accurate estimate of the final strike. However, in this case the surveyor was not kept in doubt until

the final tie was made; while the party was still 4 miles inland, Ney's monument could be seen through the transit. Final ties disclosed that the trial line hit 15·8 feet perpendicularly distant from its target, which was so close that the Commissioners recommended the line be adopted as the true boundary, as was the case for the section from the twelfth base line to Island Lake.

1950 SEASON

No further work could be undertaken until the trial line was formally accepted by the two provinces. Early in 1950, Ontario and Manitoba passed legislation (39, 40, App. I) amending the Boundary Extension Acts of 1912 to include the Island Lake and Hudson Bay points in terms of the terminal points of the trial lines surveyed in 1929 and 1948, respectively, the right line between them being defined as the true boundary. A Dominion Act about the same time, confirmed this (38, App. I).



TRANSPORTATION BY AIR

Aeroplane furnished for the 1950 season by the Manitoba Government Air Service.

The way was now clear to permanently monument the boundary between Island Lake and Hudson Bay, and in the summer of 1950 this work was completed.

The instructions issued by the Commissioners to D. E. Guard, were:

1. To construct permanent reinforced concrete monoliths at specified points on the boundary between Island Lake and Hudson Bay.
2. To clear and blaze the line in the vicinity of each monument and to cut cross lines at each.
3. To widen and blaze the line at all waterways.

The Manitoba Government Air Service furnished transportation over most of the route, but from Mile 105 to Mile 184 there were no lakes suitable for plane landing in summer and canoes were used for transport.

The Echoing and Sturgeon Rivers parallel and cross the boundary from Mile 115 to Mile 156. Both were navigable by canoe and provided access to the boundary line in the stretches where the plane could not be used.

The 1950 survey introduced a new technique to speed the work of establishing permanent concrete monoliths. Some of the material required in their construction was dropped by plane over the various sites as the work progressed and this operation was coordinated by means of a portable transceiver radio. The radio was carried to the site of each monument and used to inform the pilot how the dropped material was being received.

In a special report on the subject of dropping supplies, D. E. Guard came to the following conclusions:

1. Free drops on soft round of non-breakable material in metal containers are recommended.
2. Free drops on hard ground are impractical.
3. Parachute drops of supplies on either hard or soft ground are recommended if the parachutes are expertly packed.

The monuments erected by Mr. Guard between July 2 and August 26 were inspected by Messrs. Gauer and Pierce and found to be satisfactory.

The results achieved in surveying the two sections of the boundary, from the twelfth base line to Island Lake and from Island Lake to Hudson Bay, gave great satisfaction to the Commissioners. Not only were the trial lines so accurately produced as to be acceptable to the two provinces as parts of the true boundary, thus eliminating the expense of re-surveying, but the results demonstrated that the science of surveying had been developed to a high standard in this country.

CHAPTER IV

GENERAL DESCRIPTION OF THE COUNTRY

WINNIPEG RIVER TO LAKE OF THE WOODS

The nature of the country along this stretch of the boundary, as it existed in 1897, is described in the report of the original survey by Stewart and Saunders (App. III). The following extracts are from J. W. Pierce's report of the 1932 retracement and restoration survey.

"Commencing at Winnipeg River and extending to Shoal Lake, this line passes through an extremely rough country with numerous rock outcrops and precipitous inclines, which are broken in every conceivable manner by sharp ravines, swamps and water areas. Although local changes in elevation seldom exceed 200 feet, the frequency of these changes renders travel overland for any distance as difficult as would be expected in districts presenting much greater variations in relief"

"Soil, except in isolated patches is of little value for any agricultural purpose, though it does support a healthy growth of jack pine, poplar, spruce, balsam and birch. Occasional groves of healthy tamarack are met with, and to the south of the Canadian Pacific Railway cedar begins to appear. Much of this timber has been destroyed by fire, particularly in the vicinity of the railroads, extending along the line from Mantario Lake to High Lake, though much of this area is now rapidly reforesting with poplar and jack pine, which, if it escapes fire, will in a few years hide much of the bare rock now so greatly in evidence and at the same time be of commercial value. Some stands of jack pine suitable for tie timber were noticed in the vicinity of Crow Duck Lake, while near the south end of the line at Shoal Lake, along the narrow zone separating the rocky country from the large swamps to the west, there is a heavy growth of large poplar mixed with birch, spruce and jack pine that occasionally reaches 24 inches in diameter.

"Paralleling this line and only a few miles westerly from it there is an extensive flat country with occasional rock outcrops and large areas of muskeg and swamp which is typical of considerable portions of southeastern Manitoba. This gradually approached the line as the survey proceeded southerly until in the vicinity of Shoal Lake, narrow arms from these extensive swamps began to cross the line. Immediately south of Shoal Lake the line definitely entered this flat country and from here to the North West Angle, the country is composed of large swamps or poplar-covered flats without any apparent relief. The country in the vicinity of the International Boundary at the North West Angle of Lake of the Woods is all low, flat and marshy with very occasional rock outcrops. Lake of the Woods, here, is a marshy, weedy, shallow bay bordered by a most indefinite shore, that is composed of as one leaves the water, first,

marsh, then hay slough which merges into hay meadow in which hay is cut in some parts before the bush is reached. The waters edge is subject to wide variations with changes of only a few inches in the elevation of the lake. Lake of the Woods, here, presents few of the features that have attracted so many tourists to other parts of this well known lake.

"Marion Lake, West Hawk Lake and Long Pine Lake are the main lakes in the immediate vicinity of the boundary which have attracted tourists. The Trans-Canada Highway, which had been opened for traffic earlier in the season, is intersected by the boundary near Mile 34. Judging from the amount of traffic and from the numbers of tourists which were encountered in this vicinity, the opening of this section of the road has provided holiday facilities to the people of the district to the west which they had not been able before to take advantage of. A massive boulder with a bronze commemorative plate inscribed with the details of the opening of this road between the two provinces was found erected on the north side of the highway on the boundary line. This, and an arch which had been placed over the roadway in connection with the recent ceremony, while obviously of great interest to the passing tourists who nearly all stopped to look at it, was a source of some inconvenience to the survey party. The arch was found to be exactly on the line, it was higher than any of the summits along the line on either side, and it interfered with the production of the line.

"Moose did not appear to be very plentiful in the district at the time of the survey, but in their place were numerous jumping deer. There were frequent signs of the proximity of these deer in the vicinity of Winnipeg River and again at Shoal Lake. Large quantities of ducks were also noted in the vicinity of Shoal Lake. The lakes are usually well stocked with all the varieties of fish found in this district and, at Shoal Lake, fishing on a commercial scale was found to be in operation."

WINNIPEG RIVER TO TWELFTH BASE LINE

A general description of this area is given in Chapter V of the Report of the Commissioners issued in 1925.

TWELFTH BASE LINE TO ISLAND LAKE

The following extracts are from J. W. Pierce's report of the 1929-30 surveys.

"The district through which this line passed may be divided into two general divisions with no definite line of demarkation separating them. The first of these, which is encountered at either extremity of the line, is a rough rocky surface, broken by numerous valleys, lakes and swamps in which there is very little soil. This condition prevails over the first thirty and the last twenty miles of the line. There is no outstanding relief through the entire area. I would estimate that the maximum range of relief would not exceed 300 feet above an

altitude of 800 feet. The middle or central portion extending about forty miles along the line is an undulating clay-covered district usually with rock outcrops at the summits of the ridges and large swamps or streams in the bottoms of the valleys. Large areas of this and the adjoining rocky country have been burned over by fires that have in many cases completely burned out the spruce and tamarac swamps. Many of these are now drying out and are growing up with poplar and willow, while the spruce and its accompanying deep moss is disappearing. Very noticeable examples of this condition are to be found in the vicinity of

NATURE OF THE COUNTRY

Twelfth base line to Island Lake.



Mile 3. 1930 season.



Mile 4. 1930 season.



Mile 23. 1930 season.



Mile 50. 1930 season.



Mile 59. 1930 season.



Mile 86. 1930 season.



Mile 68. 1930 season.

Miles 45 to 50 and again between Miles 60 to 70 where extensive areas of almost open, slightly undulating clay loam soil, free of stone, would offer attractive agricultural possibilities if they were located in a suitable latitude.

"Granite predominated through the rock outcrops encountered, though considerable areas of greenstone and quartz were noticed, particularly in the vicinity of Azure Lake around Mile 25, again around Mile 60, and more frequently as Island Lake was approached.

"Extensive and evidently repeated forest fires have years ago destroyed probably seventy-five per cent of the most important timber throughout the area. That remaining consists of isolated patches of spruce, jack pine, and poplar on the uplands and spruce and tamarac in the swamps from six to twelve inches in diameter that would be of commercial value if sufficiently extensive.



TRANSPORTATION BY WATER

Shallow water conditions on the upper reaches of the Banksian River near Mile 43. Survey of 1929.

"Aside from the numerous lakes and streams that occur at either end of the line, the most important waterways are Cobham and Banksian Rivers. Cobham River, where it crossed the line near Mile 38 is a smooth-flowing muddy stream from 200 to 300 feet in width with only occasional interruptions to navigation in the form of rapids and falls. It drains nearly all the district to the southwest of its crossing at the line and is frequently used by the natives passing through the district. Banksian River, which is locally known as Pine River, originates in some swamps opposite Mile 30 and furnishes drainage of the district along the

line between Cobham River and the immediate vicinity of Island Lake. A portage nearly four miles in length was opened out to this stream from the line crossing at Cobham River, and Banksian River was used with some difficulty from that point to its outlet in Island Lake. While the greater part of Banksian River is extremely sinuous, shallow, obstructed with driftwood and in its upper reaches barely wide enough for a canoe to get around the bends, the existence of this route was invaluable to the survey transport."

NATURE OF THE COUNTRY

Island Lake to Hudson Bay



Mile 8. 1950 season.



Mile 91. 1950 season.



Mile 99. 1937 season.

Mile 100. 1937 season.

ISLAND LAKE TO ECHOING RIVER

The following extracts are from J. W. Pierce's report of the 1937 survey.

"The presence of so much snow on the ground makes it difficult to say much regarding rock outcrops through this country, it also hid many of the smaller watercourses and probably in some places has given false impressions regarding the positions of shores of lakes. The surface, in the immediate vicinity of Island Lake, is rough, rocky and broken by many deep ravines and valleys in which there are usually lakes and swamps with rockbound shores. This, in spite of

the extent of rock exposure, supports a surprisingly vigorous growth of all of the northern timber types of spruce, jack pine, birch, poplar and tamarac, which seldom attain a diameter of 10 inches. At the other extremity of the line in the vicinity of Echoing River, the surface is almost flat or slightly undulating and is made up of extensive swamps with low islands and ridges and very occasional water areas with low marshy shores. The forest cover here is principally spruce and tamarac with very occasional birch, poplar or jack pine. Except in the immediate vicinity of streams this growth is very scattered and the line passed through miles where no timber over 3 inches was encountered. There is very little timber here over 6 inches and, as forest fires have extended to this region, that is of little value. Some of the soil is stoney, and there are few rock exposures in the small percentage of area that is not swamp. Most of the uplands have been burned over by fires that have occasionally burned out the swamps and, through the final 20 miles of line, several places were noticed where the original spruce growth which had been fire-killed, on both upland and swamp, was being replaced by jack pine when there was only a very occasional jack pine amongst the former stand. The change between these two types of surface conditions, over 100 miles apart, occurred so imperceptibly yet so steadily and uniformly that it could hardly be noticed at any particular point during the progress of the survey. Extensive and repeated forest fires have destroyed large areas of timber through the entire extent of the survey and this has resulted in a noticeable lack of game. Only a very few indications of the presence of moose and deer or otter and other fur bearing animals were observed and there was almost a complete absence of the usual trappers' trails. Similarly with native settlement. A few families occupied winter quarters at Island Lake, Pierce Lake, and Kistigan Lake in the vicinity of the line, and more were reported to be staying along the road leading to Sachigo, somewhat to the east, but the district generally is very sparsely inhabited.

"All of the usual varieties of fish, including white-fish, pickerel and lake trout appear to be in good supply and of good quality, though none were caught during the survey. Our camps, when in the vicinity of native settlements, were well supplied with very fine specimens of these varieties by the visiting natives as a return for the somewhat moderate hospitality that was afforded them on their visits to the party. Plane transport is now delivering larger quantities of provisions and other commodities used in the fur trade in this country, at a very greatly reduced cost and in a vastly better condition than was possible under the former method of native transport, which appears to be being gradually replaced by this quicker and more satisfactory method. The natives are, however, being deprived of a very considerable revenue and this must be a source of concern to those interested in their welfare."

ECHOING RIVER TO HUDSON BAY

The basis of this description is E. Gauer's report of the 1947-48 survey.

Topography

The country crossed by the boundary line falls into three distinct classes: swamp lands; uplands or clay belt; and coastal plain.

The swamp lands extend from Echoing River to Mile 182, roughly 68 miles, their flatness broken by many hummocks, varying in size and rising 6 to 12 feet above the swamp. Many of the survey monuments were planted on these hummocks and, oddly enough, no rock or boulders were encountered. Two feet of moss rest on a clay subsoil. The few lakes in this section are shallow with salty water.

NATURE OF THE COUNTRY

Island Lake to Hudson Bay



Mile 210. 1950 season.



Mile 212. 1947-48 season.



Mile 229. 1950 season.



Mile 278. 1950 season.

The uplands extend from Mile 182 to Mile 241, approximately. The highest point on the line at Mile 214·5 is 586 feet above sea level, as determined by vertical angles. Most of this section has been burned by ground fires. The trees still standing are sound and unmarked by fire though the bark has fallen away.

The rise and fall from the height of land is very gradual. A deep system of valleys converges at a point west of the line about 2 miles southwest of the height of land. The main valley of this system crosses the line in a westerly direction. Hummocks and many shallow craters, 6 to 10 feet deep and usually void of any growth, occur on the uplands. The creeks are small and the numerous lakes shallow. Water was found to be good for cooking and washing.

The coastal plain, apart from the low ridges which cross the line at right angles, is flat, falling gradually to the coast. The subsoil is a sandy clay under 1 to 2 feet of sub-arctic vegetation mixed with water. In the summer it was possible to walk over this low ground by picking a path. The flat is varied by rough patches which consist of low, closely spaced hummocks which are usually sparsely covered with small spruce. Several small, shallow lakes with low banks were found; those at Miles 261 and 278 were frozen solid.

Soil

At most summits on the uplands and coastal plain, the soil consists mainly of a fine sand. At Echoing and Sturgeon Rivers, the sand content of the bank soils is less than that found farther north. At Mile 210, some cut-banks on a stream near the line were examined. The soil, exposed to a depth of 7 feet, appeared similar to the lighter loams in southern Manitoba. The banks of the Kettle River were much the same as at Mile 210, but with a higher percentage of sand.

Forest Cover

The forest cover along the whole line is all below the standard of commercial timber. However, in most areas there is sufficient for fuel and the construction of log buildings. Throughout the entire area, black spruce predominates and tamarac is found among the spruce at various points. Jack pine and birch are found as far as Sturgeon River, aspen poplar as far north as Mile 215, and balsam poplar, though very limited, is found along the banks of Black Duck River. White spruce is very scarce up to Kettle River. This species predominates in the marginal strips along the Kettle and Black Duck Rivers and continues to the edge of the open plains.

The density and size of the trees varies with the topography. The woods bordering the rivers and larger creeks are very dense, and the diameters of the trees vary between 4 and 18 inches. The marginal strips of timber round the lakes are narrow, seldom exceeding 300 feet.

Game and Fish

Neither game nor fish are plentiful. Extensive fires had probably driven game from the uplands section. The trappers catch consists mostly of those

animals which stay close to water, such as beaver, mink, otter, and weasel. Beaver is more plentiful than other animals. A few fox tracks were seen and on two occasions caribou were sighted.

There is little or no possibility of commercial fishing, although, no doubt, there is enough fish to provide for the needs of the natives.

Climate

The most serious climatic feature of the district is the length of the winter season. Freeze-up comes towards the end of October and break-up seldom prior to June. The short summer and the remoteness of the district are mainly responsible for the lack of development.

Population

The district provides a meagre living for the six hundred or so people who inhabit it. They live in three settlements, Shamattawa, York Factory, and Fort Severn, and are all Indians except for a few white men. The Indians have permanent homes in the settlements and temporary camps for the winter trapping season. These winter camps are primitive log buildings, simply furnished, and some even lack stoves. The whole Indian family moves out with the trapper, sometimes as far as 100 miles from the settlement. The Indians depend solely on trapping as a means of livelihood, and fish is their main diet.

APPENDIX I

PRINCIPAL ORDERS IN COUNCIL AND ACTS CONCERNING THE ONTARIO-MANITOBA BOUNDARY

1. Dominion Act, 33 Victoria, Chapter 3, 1870, created the Province of Manitoba and defined its boundaries as the international boundary on the south, the parallel of 50°30' north latitude on the north, and the 96th and 99th meridians of west longitude on the east and west, respectively.
2. Imperial Act, 34 and 35 Victoria, Chapter 28 (British North America Act, 1871) confirmed the right of the Dominion to establish new provinces in its territories and to increase, diminish, or otherwise alter the limits of any province with the latter's consent.
3. Ontario Act, 42 Victoria, Chapter 2, 1878, accepted recommendations of three arbitrators on the question of the western and northern boundaries of Ontario. These recommendations were known as "The Award." However, a committee of the House of Commons rejected the Act as not describing the true boundaries of Ontario, and no Federal legislation was passed to make it binding.
4. Dominion Act, 44 Victoria, Chapter 14, 1881, confirming a Manitoba Act of the same year, defined the northern boundary of Manitoba as the centre of the road allowance along the twelfth base line of the Dominion Lands Surveys system, and the eastern boundary as being the western boundary of Ontario.
5. Imperial Act, 52 and 53 Victoria, Chapter 28, The Canada (Ontario Boundary) Act, 1889, defined the boundaries of Ontario, as follows:

"Commencing at the point where the international boundary between the United States of America and Canada strikes the western shores of Lake Superior, thence westerly along the said boundary to the northwest angle of the Lake of the Woods, thence along a line drawn due north until it strikes the middle line of the course of the river discharging the waters of the lake called Lake Seul or the Lonely Lake, whether above or below its confluence with the stream flowing from the Lake of the Woods towards Lake Winnipeg, and thence proceeding eastward from the point at which the before mentioned line strikes the middle line of the course of the river last aforesaid, along the middle line of the course of the same river (whether called by the name of the English river, or as to the part below the confluence, by the name of the River Winnipeg) up to Lake Seul or the Lonely Lake, and thence along the middle line of Lake Seul or Lonely Lake to the head of that lake, and thence by a straight line to the nearest point of the middle line of the waters of Lake St. Joseph, and thence along that middle line until it reaches the foot or outlet of that lake, and thence along the middle line of the river by which the waters of Lake St. Joseph discharge themselves to the shore of the part of Hudson's Bay commonly known as

James Bay, and thence southeasterly following upon the said shore to a point where a line drawn due north from the head of Lake Temiscamingu would strike it, and thence due south along the said line to the head of the said lake, and thence through the middle channel of the said Lake into the Ottawa river, and thence descending along the middle of the main channel of the said river to the intersection by the prolongation of the western limits of the Seigneurie of Rigaud, such mid-channel being as indicated on a map of the Ottawa Ship Canal survey made by Walter Shanly, C.E. and approved by Order of the Governor General in Council, dated the twenty-first July, one thousand eight hundred and eighty-six; and thence southerly, following upon the said westerly boundary of the Seigneurie of Rigaud to the southwest angle of the said Seigneurie, and then southerly along the western boundary of the augmentation of the township of Newton to the northwest angle of the Seigneurie of Longueuil, and thence southeasterly along the southwestern boundary of said Seigneurie of New Longueuil to a stone boundary on the north bank of the Lake St. Francis, at the cove west of Point au Baudet, such line from the Ottawa river to Lake St. Francis being as indicated on a plan of the line of boundary between Upper and Lower Canada, made in accordance with the Act 23, Victoria, Chapter 21, and approved by Order of the Governor General in Council dated the 18th March, 1861."

6. Dominion Order in Council P.C. 2823, Oct. 28, 1893, recommended that Ontario, Manitoba, and the Dominion appoint surveyors to delimit the boundary line from the northwest angle of Lake of the Woods to the English (Winnipeg) River.
7. Dominion Order in Council P.C. 2218-H, Jan. 8, 1894, recommended that Ontario and Manitoba be informed that the cost of the proposed survey was estimated as not in excess of \$9,000, and that this would be shared, more or less equally, by the three governments.
8. Despatch from Lieutenant Governor of Manitoba to the Under Secretary of State, Feb. 20, 1894, declined the invitation issued to Manitoba to join in the survey, and quoted the following reasons given by the Department of his Provincial Secretary:

"I am directed to state that inasmuch as the Province of Manitoba is not the owner of the timber, the minerals or the public lands in that portion of the province lying along the eastern boundary thereof, it does not appear that the Provincial Government is sufficiently interested in the immediate limitation of the boundary to warrant the incurring of any expenditure at the present time."

9. Dominion Order in Council P.C. 93-J, June 30, 1894, recommended that Ontario be informed that Manitoba had declined to participate in the proposed survey and that the Government of Canada would be prepared to join with the Government of Ontario in the work.

10. Dominion Order in Council P.C. 2382, Aug. 1, 1894, agreed that the Dominion would join with Ontario in undertaking the survey of the boundary line from Lake of the Woods to the English (Winnipeg) River, and that both would appoint surveyors for that purpose.
11. Dominion Order in Council P.C. 2454, Oct. 16, 1897, appointed Elihu Stewart, D.L.S., to represent the Dominion as surveyor and Commissioner on the survey of the boundary line between Ontario and Manitoba.
12. Ontario Order in Council, July 1, 1897 appointed B. J. Saunders, O.L.S., to represent Ontario as surveyor and Commissioner on the survey of the boundary line between Ontario and Manitoba.
13. Dominion Order in Council P.C. 2247, Oct. 10, 1898, recommended that Ontario and Manitoba pass legislation accepting the boundary as marked on the ground by Stewart and Saunders from Lake of the Woods to the Winnipeg River, and

"The Minister further states that the Deputy Minister of Justice having been asked what further steps he would advise for confirming and establishing the line marked by Messrs. Stewart and Saunders as the boundary between the Provinces of Ontario and Manitoba, states that it can be absolutely established only by legislation, that if the legislatures of Ontario and Manitoba consent, the Parliament of Canada can by virtue of the provisions of the British North America Act, 1871, pass an Act declaring that line to be the boundary between the two provinces, and that Orders in Council of the several Governments accepting the line might be passed but these would not bind the Provincial Legislatures nor the Parliament of Canada."

14. Ontario Act, 62 Victoria, Chapter 2, 1899, accepted the boundary line as surveyed in 1897 by Stewart and Saunders as the western boundary of Ontario.
15. Dominion Order in Council P.C. 488, Jan. 14, 1911, recommended that the boundaries of Manitoba be extended but that the administration of the natural resources in the increased area remain with the Dominion.
16. Dominion Act, 2 George V, Chapter 32, The Manitoba Boundaries Extension Act, 1912, assented to by Manitoba in 2 George V, Chapter 6 (R.S.M. 1913, Chapter 18), declared that additional territory was to be added to the province and that the boundaries were to be as follows:

"The limits of the province are hereby increased so that the boundaries of the province shall be as follows: Commencing where the sixtieth parallel of north latitude intersects the western shore of Hudson Bay; thence westerly along the said parallel of latitude to the northeast corner of the province of Saskatchewan; thence southerly along the easterly boundary of the province of Saskatchewan to the international boundary dividing Canada from the United States; thence easterly along the said international boundary to the point where the said international boundary turns due

north; thence north along the said international boundary to the most northerly point thereof at or near the northwest angle of the Lake of the Woods; thence continuing due north along the westerly boundary of the province of Ontario, by virtue of "The Canada (Ontario Boundary) Act, 1889", chapter 28 of the statutes of 1889 of the United Kingdom (the said westerly boundary being the easterly boundary of the province of Manitoba) to the most northerly point of the said boundary common to the two provinces under the said Act; thence continuing due north along the same meridian to the intersection thereof with the centre of the road allowance on the twelfth base line of the system of Dominion Land Surveys; thence northeasterly in a right line to the most eastern point of Island Lake, as shown in approximate latitude $53^{\circ}30'$ and longitude $93^{\circ}40'$ on the railway map of the Dominion of Canada published, on the scale of thirty-five miles to one inch, in the year one thousand nine hundred and eight, by the authority of the Minister of the Interior; thence northeasterly in a right line to the point where the eighty-ninth meridian of west longitude intersects the southern shore of Hudson Bay; thence westerly and northerly following the shores of the said Bay to the place of commencement; and all the land embraced by the said description not now within the province of Manitoba, shall, from and after the commencement of this Act, be added thereto and the whole shall, from and after the said commencement, form and be the province of Manitoba."

17. Dominion Act, 2 George V, Chapter 40, The Ontario Boundaries Extension Act, 1912, assented to by Ontario, in 2 George V, Chapter 3, declared that additional territory was to be added to the province and that the boundaries were to be as follows:

"The limits of the province of Ontario are hereby increased so that the boundaries thereof shall include, in addition to the present territory of the said province, the territory bounded and described as follows:—Commencing at the most northerly point of the westerly boundary of the province of Ontario as determined by "The Canada (Ontario Boundary) Act, 1889". Chapter 28 of the statutes of 1889 of the United Kingdom, (the said westerly boundary being the easterly boundary of the province of Manitoba); thence continuing due north along the same meridian to the intersection thereof with the centre of the road allowance on the twelfth base line of the system of Dominion Land Surveys; thence northeasterly in a right line to the most eastern point of Island Lake, as shown in approximate latitude $53^{\circ}30'$ and longitude $93^{\circ}40'$ on the railway map of the Dominion of Canada, published on the scale of thirty-five miles to one inch, in the year one thousand nine hundred and eight, by the authority of the Minister of the Interior; thence northeasterly in a right line to the point where the eighty-ninth meridian of west longitude intersects the southern shore of Hudson Bay; thence easterly and southerly following the shore of the said bay to the point where the

notherly boundary of the Province of Ontario as established under the said Act intersects the shore of James Bay; thence westward along the said boundary as established by the said act to the place of commencement; and all the land embraced by the said description shall, from and after the commencement of this Act, be added to the Province of Ontario, and shall, from and after the said commencement, form and be part of the said province of Ontario,"

18. Ontario Order in Council 109/422, Feb. 9, 1921, declared that because of mining developments close to the defined boundary, the delimitation of the boundary on the ground was necessary, and that if Manitoba declined to participate then Ontario and the Dominion should proceed with the survey, each paying one-half the cost. It was also recommended that the Director of Surveys for Ontario (at that time, L. V. Rorke, D.L.S., O.L.S.) be appointed Commissioner to represent Ontario.
19. Dominion Order in Council P.C. 546, Feb. 26, 1921, invited Ontario and Manitoba to appoint Commissioners for making the survey of the Ontario-Manitoba boundary as defined in the Ontario Boundaries Extension Act of 1912, each paying one-third of the cost and the Dominion paying the remaining third, and recommended that in the event of Manitoba declining the invitation that the Dominion and Ontario proceed with the survey, each paying one-half of the cost. It further recommended that the Surveyor General of Dominion Lands (at that time, Dr. E. Deville) be appointed Commissioner to represent the Dominion on the Ontario-Manitoba boundary survey.
20. F. H. Peters, D.L.S., who in 1925 replaced Dr. E. Deville as Surveyor General of Dominion Lands, became ex officio the Dominion representative on the Ontario-Manitoba Boundary Commission by virtue of P.C. 546 of Feb. 26, 1921.
21. Dominion Order in Council P.C. 2115, Oct. 31, 1927, invited Ontario and Manitoba to pass legislation accepting the boundary as marked on the ground from Lake of the Woods to the twelfth base line.
22. Manitoba Act, 18 George V, Chapter 3, Feb. 7, 1928, extended the boundaries of Manitoba to include two small parcels of land transferred to the Dominion of Canada from the United States of America by the 1925 Treaty (see App. IV) which was concerned with a further demarcation of the international boundary in the vicinity of the northwest angle of Lake of the Woods. The full text follows:

AN ACT TO PROVIDE FOR THE EXTENSION OF THE BOUNDARY OF THE PROVINCE OF MANITOBA IN THE NORTHWEST ANGLE INLET OF LAKE OF THE WOODS.

WHEREAS in and by virtue of Article 1 of the Treaty between His Britannic Majesty in respect of the Dominion of Canada and the United States of America for the further demarcation of the boundary between

Canada and the United States of America, signed at Washington on the twenty-fourth day of February, 1925, the two parcels of land hereinafter described, situate, lying and being in the Northwest Angle Inlet of Lake of the Woods became the property of Canada:

AND WHEREAS the said parcels of land are situate within the boundaries of lands added to the Province of Manitoba by the "Manitoba Boundaries Extension Act, 1912";

AND WHEREAS it is expedient that the said parcels of land be added to and form part of the Province of Manitoba;

THEREFORE HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of Manitoba, enacts as follows:

1. The Legislative Assembly of Manitoba hereby consents that the limits of the Province be increased so that the following described pieces or parcels of land mentioned in the preamble hereto shall from and after the coming into force of this Act be added to and form part of the Province of Manitoba, namely:

PARCEL A.

All and singular, that certain piece or parcel of land covered by water, situate, lying and being in the Northwest Angle Inlet of Lake of the Woods and particularly described as follows: Commencing at a point, the second intersection from the south of the meridian through International Boundary Monument number nine hundred and twenty-five with the middle thread of the Northwest Angle Inlet of Lake of the Woods, said point being north two thousand nine hundred and four feet, more or less, of said International Boundary Monument number nine hundred and twenty-five, thence due north along the said meridian four hundred and seventy feet, more or less, to the third intersection from the south of the said meridian with the said middle thread of the said Northwest Angle Inlet of Lake of the Woods, thence following the sinuosities of the said middle thread of the said Northwest Angle Inlet of Lake of the Woods southerly a distance of seven hundred feet, more or less, to the place of beginning, containing by admeasurement two acres, be the same more or less, shown marked A on the plan referred to in the schedule to this Act.

PARCEL B.

All and singular, that certain piece or parcel of land covered by water, situate, lying and being in the Northwest Angle Inlet of Lake of the Woods and particularly described as follows: Commencing at a point, the fourth intersection from the south of the meridian through

International Boundary Monument number nine hundred and twenty-five with the middle thread of the Northwest Angle Inlet of Lake of the Woods, said point being north three thousand seven hundred and twenty feet, more or less, of said International Boundary Monument number nine hundred and twenty-five, thence due north along the said meridian two hundred and ninety feet, more or less, to the fifth intersection from the south of the said meridian with the said middle thread of the said Northwest Angle Inlet of Lake of the Woods, thence following the sinuosities of the said middle thread of the said Northwest Angle Inlet of Lake of the Woods southerly a distance of three hundred and twenty-five feet, more or less, to the place of beginning, containing by admeasurement one-half acre, be the same more or less, shown marked B on the plan referred to in the schedule to this Act.

2. The territorial boundaries and limits of Manitoba shall be and are hereby extended and increased as above set forth, upon the passage of an Act of the Parliament of Canada providing therefor.
3. All laws and statutes of the Province of Manitoba shall apply and extend to the whole of the territory within the above described limits, unless where otherwise expressed or necessarily implied.
4. This act shall come into force on the day it is assented to.

SCHEDULE.

The plan mentioned in section 1 of this Act is a blueprint deposited with the original copy of Bill No. 10 of the First Session of the Eighteenth Legislature and identified by the signature thereon of the Clerk of the Legislative Assembly.

23. Despatch from the Deputy Minister of the Department of the Interior to the Deputy Minister, Department of the Provincial Secretary of Manitoba, June 20, 1928, requested that Manitoba consider the subject of a survey of the Ontario-Manitoba boundary from the twelfth base line to Island Lake at an early date, because:

“The indications are that it will not be long before claims will be staked in the vicinity of the interprovincial boundary at Island Lake. Provided the boundary is surveyed before any claims have been staked across the line, all cause for possible disputes or complications will have been removed.”

24. Manitoba Order in Council 1135, Aug. 17, 1928, recommended that the province join with the Dominion and Ontario for the purpose of clearly establishing the most eastern point of Island Lake, and appointed G. A. Warrington, D.L.S., M.L.S., Commissioner to represent Manitoba in the determination of this point.

25. Manitoba Order in Council 292, March 8, 1929, recommended that Manitoba join with the Dominion and Ontario in carrying out the survey from the twelfth base line to the most eastern point of Island Lake, and that G. A. Warrington, D.L.S., M.L.S., be appointed Commissioner to represent Manitoba on this survey.
26. Ontario Act, 19 George V, Chapter 3, The Ontario and Manitoba Boundary Line Act, 1929, accepted the boundary as marked on the ground from Lake of the Woods to the twelfth base line. The full text follows:

AN ACT RESPECTING THE BOUNDARY BETWEEN THE PROVINCES OF
ONTARIO AND MANITOBA.

WHEREAS by the British North America Act, 1871, it is provided that "The Parliament of Canada may from time to time with the consent of the Legislature of any Province of the said Dominion, increase, diminish or otherwise alter the limits of such Province"; and whereas the inter-provincial boundary between the Provinces of Ontario and Manitoba has been surveyed and marked on the ground by commissioners duly appointed for that purpose, from the northwest angle of the Lake of the Woods northerly to the twelfth base line of the system of Dominion Land Surveys, in accordance with the descriptions contained in the schedule to the Act of the Imperial Parliament known as *The Canada (Ontario Boundary) Act, 1889*, and in *The Ontario Boundaries Extension Act* (2 Geo. V. Chapter 40, Dom.); and whereas it is desirable that the boundary so surveyed and marked on the ground shall be accepted and confirmed as the true and unalterable boundary between the Provinces of Ontario and Manitoba;

Therefore, His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1. This Act may be cited as *The Ontario and Manitoba Boundary Line Act, 1929*.
2. In case the Legislature of the Province of Manitoba consents thereto, the Legislature of the Province of Ontario hereby consents that the Parliament of Canada may declare that the boundary line surveyed and marked on the ground, and more particularly described in the schedule to this Act, by the Commission appointed in 1897 to delimit the boundary between the Provinces of Ontario and Manitoba from the Lake of the Woods to the Winnipeg River, consisting of Elihu Stewart, D.L.S., representing the Dominion of Canada and B. J. Saunders, O.L.S., representing the Province of Ontario, and by the Commission appointed in 1921 to delimit the boundary between the Provinces of Ontario and Manitoba from the Winnipeg River northerly consisting of the Surveyor-General of Dominion lands, representing the Dominion of Canada and the Director of Surveys for Ontario, representing the Province of Ontario, shall be the boundary line between this Province and the Province of Manitoba, although the limits of the Province may be

thereby increased, diminished or otherwise altered, and thereupon in so far as the Legislature of the Province of Ontario has power so to enact the boundary line between the Province of Ontario and the Province of Manitoba shall be as described in the said schedule.

SCHEDULE

3. Description by metes and bounds of the surveyed portions of the western boundary of the Province of Ontario.

Commencing at the most northerly point on the International Boundary between Canada and the United States at the northwest angle of the Lake of the Woods, as established by Dr. Tiarks and David Thompson under the direction of the Commissioners appointed under Article VII of the Treaty of Peace and Amity between His Britannic Majesty and the United States of America signed at Ghent the 24th December, 1814, and confirmed by Article 11 of the Ashburton Treaty of 1842, said most northerly point being styled the Initial Point of the official plan of survey of the boundary between the Provinces of Ontario and Manitoba from Lake of the Woods to Winnipeg River, which said Initial Point may be more particularly known and described as being seventy-two chains and fifty links, more or less, due north of the most northerly point on the International Boundary at the northwest angle of the Lake of the Woods as determined by Article 1 of the Treaty between His Britannic Majesty in respect of the Dominion of Canada and the United States for the further demarcation of the Boundary between Canada and the United States, signed at Washington on February 24th, 1925, which said Initial Point is also one hundred and fifty chains and one link, more or less, due north from an iron post extending four feet above ground and planted about five chains northerly from the north bank of the Northwest Angle River, bearing the following inscriptions:—"October 20th, 1818" on the south side, and on the north side the words "Convention of London" said post having been planted by the International Boundary Commissioners in 1872 to mark the boundary between the Dominion of Canada and the United States of America; which said Initial Point is also one hundred and ten chains and sixty-two links, more or less, due north from an iron post extending four feet above the ground bearing similar inscriptions and planted by the same authority as the above mentioned post.

Thence from said Initial Point due north astronomically along the boundary between the Provinces of Ontario and Manitoba as marked on the ground by the Commissioners referred to in the Act to which this description is a Schedule, a distance of two hundred and thirty-eight miles, thirteen chains and twenty-eight links, more or less, to a point at the centre of the road allowance on the north side of the twelfth Base Line of the System of Dominion Land Surveys, said point being thirty chains and fifty-seven links

due north from a concrete monument on said Boundary, which said monument is about three feet high above the ground and bearing the following inscriptions: on the east side "No. 218 Ontario" and on the west side "No. 218 Manitoba," said Boundary from the Initial Point to the Winnipeg River being marked at intervals of approximately one mile in length by iron posts and mounds, each post bearing the number corresponding to the number of miles which it is distant from said Initial Point on the south side, the letters "MAN" for Manitoba on the west side and the letters "ONT" for Ontario on the east side, and from the Winnipeg River northerly the said Boundary being marked at intervals of approximately six miles in length by concrete monuments bearing brass plates on which are the following inscriptions: on the east side, the number of the monument and the word "ONTARIO" and on the west side the number of the monument and the word "MANITOBA", said boundary from the Winnipeg River northerly being also marked at intervals of approximately one mile in length with special posts and mounds, the posts bearing the inscriptions "Interprovincial Boundary" "Ontario-Manitoba," each post having also marked on it the number of the monument, the number of the bench mark and the year of the survey.

That part of the said Boundary which lies between the Lake of the Woods and Winnipeg River is shown on the official plan of the survey of said Boundary, dated 30th April, 1898, and signed by Elihu Stewart, D.L.S., and B. J. Saunders, O.L.S., the Commissioners appointed in 1897, and that part of said Boundary lying between the Winnipeg River and the twelfth Base Line aforesaid being shown on a series of sixteen plans of survey published in atlas form in 1925 and signed by the Surveyor-General of Dominion Lands, and the Director of Surveys for the Province of Ontario, as the Commissioners appointed in 1921, all of which plans are of record in the Department of the Interior at Ottawa, in the Department of Public Works at Winnipeg and the Department of Lands and Forests at Toronto.

27. Manitoba Act, 19 George V, Chapter 4, An Act Respecting the Boundary Between the Provinces of Manitoba and Ontario, 1929, confirmed the boundary as marked on the ground from Lake of the Woods to the twelfth base line, being similar to the Ontario Act of the same year which is printed in full in Item 26 of this Appendix.
28. Dominion Act, 20 George V, Chapter 28, The Manitoba Boundaries Extension Act, 1930, confirmed the transfer of two small parcels of submerged land to Manitoba as consented to in the Manitoba Act of 1928, these two parcels of land, totalling $2\frac{1}{2}$ acres, being the ones ceded to the Dominion by the United States of America in the 1925 Treaty (See App. IV). This Treaty was concerned with an adjustment in the International Boundary in the vicinity of the northwest angle of Lake of the Woods. The Manitoba Act of 1928 is printed in full in Item 22 of this Appendix.

29. Dominion Order in Council P.C. 597, March 18, 1930, accepted point "A", at the extremity of the trial line surveyed in 1929, as the most eastern point of Island Lake. The Order in Council is reproduced in full, as follows:

WHEREAS by the Ontario Boundaries Extension Act, 1912, Chapter 40, and by the Manitoba Boundaries Extension Act, 1912, Chapter 32, that portion of the Interprovincial Boundary between Manitoba and Ontario from the Twelfth base line of the system of Dominion Land Surveys to the east end of Island lake is described as follows, commencing at the point where the Boundary line, produced due north from the northwest angle of the Lake of the Woods, intersects the centre of the road allowance at the Twelfth base line: "Thence northeasterly in a right line to the most eastern point of Island lake, as shown in approximate latitude $53^{\circ} 30'$ and longitude $93^{\circ} 40'$ on the railway map of the Dominion of Canada published on the scale of thirty-five miles to one inch, in the year one thousand nine hundred and eight, by the authority of the Minister of the Interior."

AND WHEREAS the Commissioners duly appointed by Orders in Council of their respective Governments to delimit the Boundary between Manitoba and Ontario, namely L. V. Rorke, Surveyor General of Ontario, for the Province of Ontario; G. A. Warrington, M.L.S. for the Province of Manitoba, and F. H. Peters, Surveyor General of Canada, for the Dominion of Canada, met in conference at Winnipeg on the 17th of January, 1930, and after giving due and careful consideration to all the evidence afforded by the surveys and reports of the surveyor who surveyed the trial line from the Twelfth base line to the east end of Island Lake, during the season of 1929, under the direction of the Commissioners, agreed together to accept a point at the extremity of said trial line as the most eastern point of Island lake, said point being distant 0·078 chains on a bearing of N $44^{\circ} 25' 50''$ E from a large hub set in a stone mound on said line and being shown as Point "A" on the attached map:

AND WHEREAS the Minister of the Interior reports that the said point "A" is a controlling point which directly affects the position of the said Interprovincial Boundary between Manitoba and Ontario throughout its length from the Twelfth base line to the shores of Hudson Bay;

NOW THEREFORE, His Excellency the Governor General in Council, on the recommendation of the Minister of the Interior, is pleased to confirm the decision of the said Commissioners to define the said point "A" as being the most eastern point of Island lake in accordance with the meaning of the Manitoba Boundaries Extension Act, 1912, and the Ontario Boundaries Extension Act, 1912, and it is hereby confirmed accordingly.

30. Manitoba Order in Council 652, May 20, 1930, accepted point "A", at the extremity of the trial line surveyed in 1929, as the most eastern point of Island Lake, being similar to that of the Dominion Order reproduced in full in Item 29 of this Appendix.

31. Manitoba Order in Council 269, Feb. 27, 1931, appointed S. E. McColl, D.L.S., M.L.S., Director of Surveys for Manitoba, as Commissioner to represent Manitoba on the survey of the boundary between Manitoba and Ontario as set forth in Manitoba Order in Council 292/29.
32. Manitoba Order in Council 567, May 9, 1931, repealed Order 269/31 and re-appointed G. A. Warrington, D.L.S., M.L.S., as Commissioner to complete the work connected with the 1929 and 1930 boundary survey from the twelfth base line to Island Lake, and re-appointed S. E. McColl, D.L.S., M.L.S., as Commissioner to represent Manitoba on that part of the boundary survey from Island Lake to Hudson Bay.
33. Ontario Order in Council, July 19, 1932, accepted point "A" at the extremity of the trial line surveyed in 1929 as the most eastern point of Island Lake, being similar to that of the Dominion Order of 1930 reproduced in full in Item 29 of this Appendix.
34. Ontario Order in Council 216, June 12, 1935, appointed C. H. Fullerton, D.L.S., O.L.S., as Surveyor General of Ontario and as Commissioner to represent Ontario on the Ontario-Manitoba boundary survey.
35. Manitoba Order in Council 469, April 24, 1940, appointed H. E. Beresford, D.L.S., M.L.S., Director of Surveys for Manitoba, as Commissioner to represent the province on all matters relating to the provincial boundaries.
36. Ontario Order in Council 252/120, May 8, 1946, appointed F. W. Beatty, D.L.S., O.L.S., as Commissioner to represent Ontario on matters pertaining to the Ontario-Manitoba boundary.
37. Dominion Order in Council P.C. 144, Jan. 15, 1948, appointed B. W. Waugh, D.L.S., as Surveyor General of Dominion Lands, which by virtue of P.C. 546, Feb. 26, 1921, made him ex officio the Commissioner for the Dominion on the Ontario-Manitoba boundary survey.
38. Dominion Act, 14 George VI, Chapter 16, 1950, An Act to amend The Manitoba Boundaries Extension Act, 1912, and The Ontario Boundaries Extension Act, confirmed the definite locations of the Island Lake and Hudson Bay points as determined in the 1929 and 1948 surveys respectively, and amended the above-mentioned Acts of 1912 accordingly. The full text of the Act is reproduced as follows:

His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:

1. Section three of The Manitoba Boundaries Extension Act, 1912, chapter thirty-two of the statutes of 1912, and section two of The Ontario Boundaries Extension Act, chapter forty of the statutes of 1912, shall be read and construed as though the reference in each of those sections to

"the most eastern point of Island Lake, as shown in approximate latitude $53^{\circ}30'$ and longitude $93^{\circ}40'$ on the railway map of the Dominion of

Canada published on the scale of thirty-five miles to one inch, in the year one thousand nine hundred and eight, by the authority of the Minister of the Interior"

were in each case a reference to

"the most eastern point of Island Lake, as fixed on the ground in the year 1930 by the erection of concrete monument number 295 of the Ontario-Manitoba Boundary Survey and situated in about north latitude $53^{\circ}44'19''\cdot42$ and in about west longitude $93^{\circ}39'14''\cdot91$ "

and as though the reference in each of those sections to

"the point where the eighty-ninth meridian of west longitude intersects the southern shore of Hudson Bay"

were in each case a reference to

"a point twenty-one and four-tenths feet due west astronomic from the point where the eighty-ninth meridian of west longitude intersects the southern shore of Hudson Bay, as the latter point was fixed by the Geodetic Survey of Canada in the year 1929".

2. This Act shall come into force on a day to be fixed by proclamation of the Governor in Council, but such proclamation shall not be issued until after the Legislature of Ontario has consented to any increase, diminution or alteration of the limits of the Province of Ontario provided for by this Act and the Legislature of Manitoba has consented to any increase, diminution or alteration of the limits of the Province of Manitoba provided for by this Act.

39. Manitoba Act, 14 George VI, Chapter 3, An Act to Amend an Act Concerning the Boundaries of Manitoba, 1950, accepted the Island Lake and Hudson Bay points as determined in the 1929 and 1948 surveys respectively, being similar to the Dominion Act of the same year which is printed in full in Item 38 of this Appendix.
40. Ontario Act, 14 George VI, Chapter 48, The Ontario-Manitoba Boundary Act, 1950, accepted the Island Lake and Hudson Bay points as determined in the 1929 and 1948 surveys respectively, being similar to the Dominion Act of the same year which is printed in full in Item 38 of this Appendix.
41. Ontario Act, 2 Elizabeth II, Chapter 10, An Act Respecting the Boundary Between the Provinces of Ontario and Manitoba, 1953, accepted the boundary as marked on the ground from the twelfth base line to Hudson Bay. The complete text follows:

WHEREAS by the British North America Act, 1871 it is provided that "The Parliament of Canada may from time to time, with the consent of the Legislature of any Province of the said Dominion, increase, diminish or otherwise alter the limits of such Province"; and whereas the interprovincial boundary between the Provinces of Ontario and Manitoba has been surveyed and marked on the ground by commissioners duly appointed for that purpose from the twelfth base line of the system of Dominion land surveys

to the southern shore of Hudson Bay in accordance with the descriptions contained in the Schedule to the Act of the Imperial Parliament known as the Canada (Ontario Boundary) Act 1889 and in the Acts of the Parliament of Canada known as The Manitoba Boundaries Extension Act, 1912 and An Act to amend The Manitoba Boundaries Extension Act, 1912, and The Ontario Boundaries Extension Act; and whereas it is desirable that the boundary so surveyed and marked on the ground and shown on three plans of the Ontario-Manitoba Boundary, namely.

- (a) from Monument No. 220 on the twelfth base line to Monument No. 295 at east end of Island Lake;
- (b) from Monument 295 at east end of Island Lake to Monument No. 356; and
- (c) from Monument No. 356 to Monument No. 457A at Hudson Bay duly approved by the three commissioners on the 26th day of January, 1953, and of record in the Department of Lands and Forests of the Province of Ontario, be accepted as the true and unalterable boundary between the Provinces of Ontario and Manitoba;

THEREFORE, Her Majesty by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

1. The Legislature of the Province of Ontario hereby consents that the Parliament of Canada may declare that the boundary line surveyed and marked on the ground,

- (a) by the commission appointed in 1929 to delimit the boundary between the Provinces of Ontario and Manitoba from the twelfth base line of the system of Dominion land surveys to the most eastern point of Island Lake, consisting of the Surveyor General of Dominion Lands representing Canada, the Surveyor General of the Department of Lands and Forests, Ontario, representing the Province of Ontario and the Chief Surveyor of The Department of Public Works, Manitoba, representing the Province of Manitoba; and
- (b) by the commission appointed in 1931 to delimit the boundary between the Provinces of Ontario and Manitoba from the most eastern point of Island Lake to the southern shore of Hudson Bay, consisting of the Surveyor General of Dominion Lands, representing Canada, the Surveyor General of the Department of Lands and Forests, Ontario, representing the Province of Ontario, and the Director of Surveys of The Department of Mines and Natural Resources, Manitoba, representing the Province of Manitoba, and more particularly described in the Schedule to this Act, is the boundary line between the Province of Ontario and the Province of Manitoba from the twelfth base line of the system of Dominion land surveys to the southern shore of Hudson Bay although the

limits of the Province may be thereby increased, diminished, or otherwise altered; and thereupon, in so far as the Legislature has power so to enact, the boundary line between the Province of Ontario and the Province of Manitoba from the twelfth base line of the system of Dominion Land Surveys to the southern shore of Hudson Bay is as shown on three plans of the Ontario-Manitoba Boundary, namely,

- (c) from Monument No. 220 on the twelfth base line to Monument No. 295 at east end of Island Lake;
- (d) from Monument No. 295 at east end of Island Lake to Monument No. 356; and
- (e) from Monument No. 356 to Monument No. 457A at Hudson Bay, and as more particularly described in the Schedule to this Act, duly approved by the three commissioners on the 26th day of January, 1953, and of record in the Department of Lands and Forests of the Province of Ontario.

2. This Act comes into force on a day to be named by the Lieutenant-Governor by his Proclamation.

3. This Act may be cited as The Ontario-Manitoba Boundary Line Act, 1953.

SCHEDULE

Commencing at a point in the centre of the road allowance on the north side of the twelfth base line of the system of Dominion land surveys, said point being thirty chains and fifty-seven links due north from a concrete monument on said boundary, which said monument is about three feet high above the ground and bearing the following inscriptions: on the east side, "No. 218 ONTARIO", and on the west side, "No. 218 MANITOBA", the said point being marked by a concrete monument about three feet high above the ground and bearing the following inscriptions: on the southeast side, "No. 220 ONTARIO", and on the northwest side, "No. 220 MANITOBA", thence in a right line on an initial azimuth of $44^{\circ}25'50''$ along the boundary between the Provinces of Ontario and Manitoba, as marked on the ground by the Commissioners referred to in the Act to which this description is a Schedule, a distance of eighty-seven miles, fifty-five chains and thirty-two and eight-tenths links more or less to the most eastern point of Island Lake, the said point being fixed on the ground in the year 1930 and being marked by a concrete monument bearing the following inscriptions: on the southeast side, "No. 295 ONTARIO", and on the northwest side "No. 295 MANITOBA", and situated in about North Latitude $53^{\circ}44'19''\cdot42$ and in about West Longitude $93^{\circ}39'14''\cdot91$; said boundary from the point of commencement to the most eastern point of Island Lake being marked at intervals of approximately one mile in length by special posts and mounds, each post having marked on it the number of the post

and the year of survey, and said portion of the boundary being also marked at intervals of approximately six miles in length by concrete monuments bearing brass plates on which are the following inscriptions: on the southeast side, the number of the monument and the word "ONTARIO", and on the northwest side, the number of the monument and the word "MANITOBA"; thence in a right line on an initial azimuth of $38^{\circ}40'34''$ along the said boundary a distance of two hundred and eighty-two miles, thirty-three chains and fifty-seven and one-tenth links more or less to the Terminal Point marked by a concrete monument about four feet high above the ground and bearing the following inscriptions: on the southeast side, "No. 457A ONTARIO", and on the northwest side, "No. 457A MANITOBA", the said point being twenty-one and four-tenths feet due west astronomic from the point where the eighty-ninth meridian of west longitude intersects the southern shore of Hudson Bay, as the latter point was fixed by the Geodetic Survey of Canada in the year 1929; said boundary from the most eastern point of Island Lake to the said Terminal Point being marked at intervals of from one mile to three miles in length by special posts of the same type as the said special post above described, and said portion of the boundary being also marked at intervals of from five miles to twenty-five miles in length by concrete monuments bearing brass plates on which are the following inscriptions: on the southeast side, the number of the monument and the word "ONTARIO", and on the northwest side, the number of the monument and the word "MANITOBA"; and as said boundary is shown on three plans of the Ontario-Manitoba Boundary, namely (1) from monument No. 220 on the twelfth base line to monument No. 295 at east end of Island Lake; (2) from Monument No. 295 at east end of Island Lake to monument No. 356; and (3) from monument No. 356 to monument No. 457A at Hudson Bay; duly approved by the three Commissioners on the 26th day of January, 1953, and of record in the Department of Lands and Forests of the Province of Ontario.

42. Manitoba Act, 2 Elizabeth II, Chapter 6, An Act Respecting the Boundary Between the Provinces of Manitoba and Ontario, 1953, confirmed the boundary as marked on the ground from the twelfth base line to Hudson Bay, being similar to the Ontario Act passed in the same year and reproduced in full in Item 41 of this Appendix.
43. An Act of the Federal Government, 2 Elizabeth II, Chapter 9, The Ontario-Manitoba Boundary Act, 1954, confirmed legislation passed by the provinces of Ontario and Manitoba accepting the boundary as surveyed on the ground from Lake of the Woods to Hudson Bay. The complete text follows:

WHEREAS the interprovincial boundary between the Provinces of Ontario and Manitoba has been surveyed and marked on the ground by commissioners appointed for the purpose in accordance with the descriptions in the Schedule to the Act of the Parliament of the United Kingdom known

as the Canada (Ontario-Boundary) Act, 1889, and in the Acts of the Parliament of Canada known as The Manitoba Boundaries Extension Act, 1912, 2 George V, chapter 32, The Ontario Boundaries Extension Act, 2 George V, Chapter 40, and An Act to amend The Manitoba Boundaries Extension Act, 1912, and The Ontario Boundaries Extension Act, 14 George VI, chapter 16, which boundary line as so surveyed and marked is described in the Schedule;

AND WHEREAS, the legislatures of the Provinces of Ontario and Manitoba having consented thereto, it is desirable that the boundary so surveyed and marked on the ground be declared the boundary between the Provinces of Ontario and Manitoba;

NOW THEREFORE, Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:

1. This Act may be cited as the Ontario-Manitoba Boundary Act, 1954.
2. The boundary line surveyed and marked on the ground by commissioners appointed in 1897, 1921, 1929 and 1931 to delimit the boundary between the Provinces of Ontario and Manitoba and described in the Schedule is hereby declared to be the boundary line between the Provinces of Ontario and Manitoba, and in so far as the boundary line so described increases, diminishes or otherwise alters the limits of those Provinces, their limits are increased, diminished or otherwise altered accordingly.
3. This Act shall come into force on a day to be fixed by proclamation of the Governor in Council.

SCHEDULE

*Description by Metes and Bounds of the Boundary Line between the Province
of Ontario and the Province of Manitoba*

Commencing at the most northerly point on the International Boundary between Canada and the United States at the northwest angle of the Lake of the Woods, as established by Dr. Tiarks and David Thompson under the direction of the commissioners appointed under Article VII of the Treaty of Peace and Amity between His Britannic Majesty and the United States of America signed at Ghent the 24th December 1814, and confirmed by Article II of the Ashburton Treaty of 1842, said most northerly point being styled the Initial Point on the official plan of survey of the boundary between the Provinces of Ontario and Manitoba from Lake of the Woods to Winnipeg River, which said Initial Point may be more particularly known and described as being seventy-two chains and fifty links, more or less, due north to the most northerly point on the International Boundary at the northwest angle of the Lake of the Woods as determined by Article I of the Treaty between His Britannic Majesty in respect of the Dominion of Canada and the United States for the further Demarcation of the Boundary between Canada and the United States, signed at Washington on February 24th, 1925, which said Initial Point is also one hundred

and fifty chains and one link, more or less, due north from an iron post extending four feet above ground and planted about five chains northerly from the north bank of the Northwest Angle River, bearing the following inscriptions:—"October 20th, 1818" on the south side, and on the north side the words "Convention of London" said post having been planted by the International Boundary Commissioners in 1872 to mark the boundary between the Dominion of Canada and the United States of America; which said Initial Point is also one hundred and ten chains and sixty-two links, more or less, due north from an iron post extending four feet above the ground bearing similar inscriptions and planted by the same authority as the above mentioned post.

Thence from said Initial Point due north astronomically along the boundary between the Provinces of Ontario and Manitoba, as marked on the ground by the commissioners appointed for the purpose in 1897 and 1921, a distance of two hundred and thirty-eight miles, thirteen chains and twenty-eight links, more or less, to a point at the centre of the road allowance on the north side of the twelfth base line of the system of Dominion land surveys, said point being thirty chains and fifty-seven links due north from a concrete monument on said boundary, which said monument is about three feet high above the ground and bearing the following inscriptions: on the east side, "No. 218 ONTARIO", and on the west side, "No. 218 MANITOBA", the said point being marked by a concrete monument about three feet high above the ground and bearing the following inscriptions: on the southeast side, "No. 220 ONTARIO", and on the northwest side, "No. 220 MANITOBA", said boundary from the Initial Point to the Winnipeg River being marked at intervals of approximately one mile in length by iron posts and mounds, each post bearing the number corresponding to the number of miles which it is distant from said Initial Point on the south side, the letters "MAN" for Manitoba on the west side and the letters "ONT" for Ontario on the east side, and from the Winnipeg River northerly to the point marked by the monument bearing the inscriptions, on the southeast side "No. 220 ONTARIO", and on the northwest side "No. 220 MANITOBA", the said boundary being marked at intervals of approximately six miles in length by concrete monuments bearing brass plates on which are the following inscriptions: on the east side the number of the monument and the word "ONTARIO" and on the west side the number of the monument and the word "MANITOBA", said boundary from the Winnipeg River to the point marked by the monument bearing the inscriptions, on the southeast side, "No. 220 ONTARIO", and on the northwest side, "No. 220 MANITOBA" being also marked at intervals of approximately one mile in length with special posts and mounds, the posts bearing the inscriptions "Interprovincial Boundary" "Ontario-Manitoba", each post having also marked on it the number of the monument, the number of the bench mark and the year of the survey.

That part of the said boundary which lies between the Lake of the Woods and Winnipeg River is shown on the official plan of the survey of said boundary dated 30th April, 1898, and signed by Elihu Stewart, D.L.S., and B. J. Saunders,

O.L.S., the commissioners appointed in 1897, and that part of said boundary lying between the Winnipeg River and the twelfth Base Line aforesaid being shown on a series of sixteen plans of survey published in atlas form in 1925 and signed by the Surveyor-General of Dominion Lands, and the Director of Surveys for the Province of Ontario, as the commissioners appointed in 1921, all of which plans are of record in the Department of Mines and Technical Surveys at Ottawa.

Thence in a right line on an initial azimuth of $44^{\circ}25'50''$ along the boundary between the Provinces of Ontario and Manitoba, as marked on the ground by the commissioners appointed in 1929, a distance of eighty-seven miles, fifty-five chains and thirty-two and eight-tenths links more or less to the most eastern point of Island Lake, the said point being fixed on the ground in the year 1930 and being marked by a concrete monument bearing the following inscriptions: on the southeast side, "No. 295 ONTARIO", and on the northwest side, "No. 295 MANITOBA" and situated in about North Latitude $53^{\circ}44'19''\cdot42$ and in about West Longitude $93^{\circ}39'14''\cdot91$; said boundary from the point marked by the monument bearing the inscription on the southeast side "No. 220 ONTARIO", and on the northwest side "No. 220 MANITOBA" to the most eastern point of Island Lake being marked at intervals of approximately one mile in length by special posts and mounds, each post having marked on it the number of the post and the year of survey, and said portion of the boundary being also marked at intervals of approximately six miles in length by concrete monuments bearing brass plates on which are the following inscriptions: on the southeast side, the number of the monument and the word "ONTARIO", and on the northwest side, the number of the monument and the word "MANITOBA"; thence in a right line on an initial azimuth of $38^{\circ}40'34''$ along the said boundary a distance of two hundred and eighty-two miles, thirty-three chains and fifty-seven and one-tenth links more or less to the Terminal Point marked by a concrete monument about four feet high above the ground and bearing the following inscriptions: on the southeast side, "No. 457A ONTARIO", and on the northwest side, "No. 457A MANITOBA", the said point being twenty-one and four-tenths feet due west astronomic from the point where the eighty-ninth meridian of west longitude intersects the southern shore of Hudson Bay, as the latter point was fixed by the Geodetic Survey of Canada in the year 1930; said boundary from the most eastern point of Island Lake to the said Terminal Point being marked at intervals of from one mile to three miles in length by special posts of the same type as the special posts above described as marking the boundary from the point marked by the monument bearing the inscriptions, on the southeast side, "No. 220 ONTARIO", and on the northwest side, "No. 220 MANITOBA", to the most eastern point of Island Lake, and said portion of the boundary being also marked at intervals of from five miles to twenty-five miles in length by concrete monuments bearing brass plates on which are the following inscriptions: on the southeast side, the number of the monument and the word "ONTARIO", and on the northwest side, the number of the monument and the word

"MANITOBA"; and as said boundary is shown on three plans of the Ontario-Manitoba boundary, namely (1) from monument No. 220 on the twelfth Base Line to monument No. 295 at east end of Island Lake; (2) from monument No. 295 at east end of Island Lake to monument No. 356; and (3) from monument No. 356 to monument No. 457A at Hudson Bay; duly approved by the three Commissioners appointed in 1931 on the 26th day of January, 1953, and of record in the Department of Mines and Technical Surveys at Ottawa.

APPENDIX II

ONTARIO-MANITOBA BOUNDARY
SUMMARY OF MONUMENT DATA
FROM LAKE OF THE WOODS TO WINNIPEG RIVER
AND
FROM THE TWELFTH BASE LINE TO HUDSON BAY
GIVING:

1. Number and type of each monument.
2. Geographic coordinates of each monument, calculated from surveyed azimuths and distances between them, distances being previously reduced to sea-level equivalents. Datum for coordinates is:
Latitude $49^{\circ}23'51''\cdot35$
Longitude $95^{\circ}09'11''\cdot36$,
being the position quoted by the International Boundary Commission for the Northwest Angle, Lake of the Woods (T.P. 1). Coordinates quoted do not constitute legal definition of the boundary.
3. Mileage of each monument, as measured. Mileages are expressed in miles and chains, chains being reckoned from the next previous whole mile. Mileages are listed in three series, commencing as follows:
 - (a) At Northwest Angle, Lake of the Woods, as defined by International Boundary Commission, 1872.
 - (b) At the centre of the road allowance at the twelfth base line (Mon. 220).
 - (c) At the most eastern point of Island Lake (Mon. 295).
4. Forward azimuth from each monument to the next succeeding monument.
5. Elevation, in feet above mean sea level, of the ground at each monument.

Abbreviations:

Wo. stands for Wooden Post.

I.P. stands for Iron Post.

P. stands for Standard Iron Post.

P. Rock stands for Standard Rock Post.

Pit stands for Pit or pits.

M. stands for Mound.

S.M. stands for Stone Mound.

NOTE: Monument data between Winnipeg River and the twelfth base line correspond in all respects with those reported by the Commission in 1925, except in respect of cumulative mileage, which is here reported for convenience in terms of the revised mileage found for Monument 82 by the retracement of 1932. (See Chap. 3, 1932 Retracement Survey).

SUMMARY OF MONUMENT DATA

Monument		Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth	Eleva- tion in feet above M.S.L.
No.	Type	° ' "	° ' "	Miles—Chains	° ' "	
0	No Monument.....	49 23 51.3	95 09 11.3	0—0.0000	0 00 04	Water level
1	Wo. and I.P.....	49 24 07.6	95 09 11.3	0—25.0000	359 59 03	1059
2	Wo. and I.P.P. Pit M.....	49 24 43.4	95 09 11.4	1—00.0043	0 00 05	1064
3	Wo. and I.P.P. Pit M.....	49 25 35.5	95 09 11.4	1—79.9647	359 59 39	1066
4	Wo. and I.P.....	49 26 27.6	95 09 11.4	2—79.9643	359 59 00	1071
5	P. Pit M.....	49 26 58.5	95 09 11.4	3—47.4250	0 01 34	1071
6	Wo. and I.P.....	49 27 05.0	95 09 11.4	3—57.5146	0 01 34	1064
7	Wo. and I.P.....	49 28 13.0	95 09 11.3	5—01.8507	359 59 05	1065
7A	Concrete Mon.....	49 28 25.6	95 09 11.3	5—21.2582	359 59 05	1088
8	Wo.....	49 29 03.2	95 09 11.3	5—78.9943	359 59 05	1073
9	Wo. and I.P.....	49 29 03.8	95 09 11.3	5—79.8511	0 00 05	1070
9A	P. Rock, S.M.....	49 29 45.9	95 09 11.3	6—64.6485	0 00 05	1092
10	Wo. and I.P.....	49 29 55.8	95 09 11.3	6—79.8385	0 00 02	1079
11	Wo.....	49 30 25.0	95 09 11.3	7—44.5926	0 00 02	1059
12	Wo. and I.P.....	49 30 47.8	95 09 11.3	7—79.7096	0 00 10	1128
12A	P. Rock, S.M.....	49 30 50.4	95 09 11.3	8—3.7018	0 00 10	1130
12B	P. Rock, S.M.....	49 31 37.2	95 09 11.3	8—75.5425	0 00 10	1129
13	Wo. and I.P.....	49 31 39.9	95 09 11.3	8—79.6494	0 00 08	1110
13A	P. Rock, S.M.....	49 32 30.9	95 09 11.3	9—77.9545	0 00 08	1140
14	Wo. and I.P.....	49 32 32.0	95 09 11.3	9—79.6144	359 59 47	1132
14A	P. Rock, S.M.....	49 33 11.6	95 09 11.3	10—60.4753	359 59 47	1136
15	Wo. and I.P.....	49 33 24.0	95 09 11.3	10—79.6229	0 00 05	1107
16	Wo. and I.P.....	49 34 16.1	95 09 11.3	11—79.6230	359 58 47	1086
17	Wo.....	49 34 33.7	95 09 11.3	12—26.5213	359 58 47	1140
17A	Concrete Mon.....	49 34 34.2	95 09 11.3	12—27.3783	359 58 47	1142
18	Wo. and I.P.....	49 35 08.2	95 09 11.4	12—79.6054	359 59 26	1088
19	Wo. and I.P.....	49 35 17.7	95 09 11.4	13—14.1131	0 00 19	1062
20	Wo.....	49 36 12.3	95 09 11.4	14—17.9986	359 59 22	1075
20A	P. Rock, S.M.....	49 36 22.0	95 09 11.4	14—32.8532	359 59 22	1160
21	Wo.....	49 36 52.6	95 09 11.4	14—79.8452	359 59 26	1068
22	Wo. and I.P.....	49 36 59.9	95 09 11.4	15—11.1042	359 59 26	1070
23	Not found.....					
24	Wo.....	49 37 36.7	95 09 11.4	15—67.6656	359 59 26	1075
24A	P. Rock, S.M.....	49 37 37.0	95 09 11.4	15—68.1064	359 59 26	1080
25	Wo. and I.P.....	49 37 41.7	95 09 11.4	15—75.2464	359 59 19	1062
26	Wo. and I.P.....	49 38 07.2	95 09 11.4	16—34.5483	359 59 19	1070
27	Wo. and I.P.....	49 38 18.1	95 09 11.4	16—51.1935	359 59 19	1066
28	Wo. and I.P.....	49 38 45.7	95 09 11.4	17—13.6670	0 00 02	1069
28A	Concrete Mon.....	49 38 54.2	95 09 11.4	17—26.6743	0 00 02	1172
29	Wo. and I.P.....	49 39 28.6	95 09 11.4	17—79.5494	359 59 47	1094
29A	P. Rock, S.M.....	49 40 13.9	95 09 11.4	18—69.1040	359 59 47	1184
30	Wo.....	49 40 16.8	95 09 11.4	18—73.5134	359 59 47	1169
31	Wo. and I.P.....	49 40 20.6	95 09 11.4	18—79.4394	0 00 02	1147
31A	P. Rock, S.M.....	49 41 02.9	95 09 11.4	19—64.4006	0 00 02	1210
32	Wo. and I.P.....	49 41 12.6	95 09 11.4	19—79.3209	359 59 26	1179
33	Wo. and I.P.....	49 41 31.8	95 09 11.4	20—28.6841	359 59 26	1120
34	Wo. and I.P.....	49 42 05.7	95 09 11.4	21—00.8378	359 59 26	1138
34A	P. Rock, S.M.....	49 42 06.4	95 09 11.4	21—01.9067	359 59 26	1147
35	Wo. and I.P.....	49 42 13.4	95 09 11.4	21—12.6789	359 59 26	1113
36	Wo. and I.P.....	49 42 29.9	95 09 11.4	21—37.9397	359 59 26	1124
37	Wo. and I.P.....	49 42 33.9	95 09 11.4	21—44.1347	359 59 26	1118
37A	P. Rock, S.M.....	49 42 48.3	95 09 11.4	21—66.2674	359 59 26	1201
38	Wo. and I.P.....	49 42 56.6	95 09 11.4	21—79.0035	0 00 56	1131
39	Wo. and I.P.....	49 43 48.5	95 09 11.4	22—78.7520	359 59 26	1204
39A	P. Rock, S.M.....	49 44 00.9	95 09 11.4	23—17.7115	359 59 26	1233

SUMMARY OF MONUMENT DATA—Continued

No.	Monument	Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth	Eleva- tion in feet above M.S.L.
	Type					° ' "
		° ' "	° ' "			Miles—Chains
39B	Concrete Mon.	49 44 20.9	95 09 11.4	23—48.4178	359 59 26	1230
40	Wo. and I.P.	49 44 40.6	95 09 11.4	23—78.6820	359 58 50	1201
40A	P. Rock, S.M.	49 45 28.5	95 09 11.4	24—72.2211	359 58 50	1160
41	Wo. and I.P.	49 45 32.6	95 09 11.4	24—78.5230	359 59 29	1147
42	Wo. and I.P.	49 46 05.6	95 09 11.5	25—49.2800	0 00 16	1090
42A	P. Rock, S.M.	49 46 24.3	95 09 11.5	25—77.9758	0 00 16	1213
43	Wo. and I.P.	49 46 24.6	95 09 11.5	25—78.4534	359 59 20	1210
44	Wo. and I.P.	49 47 16.5	95 09 11.5	26—78.1186	359 59 50	1192
45	Wo. and I.P.	49 47 31.2	95 09 11.5	27—20.7674	359 59 50	1163
45A	P. Rock, S.M.	49 47 36.4	95 09 11.5	27—28.7543	359 59 50	1236
46	P. Rock, S.M.	49 48 08.4	95 09 11.5	27—77.8452	0 00 31	1199
47	Wo. and I.P.	49 48 55.0	95 09 11.5	28—69.4832	0 00 31	1102
48	Not found.					
49	Wo. and I.P.	49 49 00.4	95 09 11.5	28—77.6960	359 59 33	1198
49A	Concrete Mon.	49 49 13.8	95 09 11.5	29—18.3053	359 59 33	1241
50	Wo. and I.P.	49 49 52.3	95 09 11.5	29—77.4424	0 00 41	1200
50A	P. Rock, S.M.	49 50 31.6	95 09 11.5	30—57.8435	0 00 41	1242
51	Wo. and I.P.	49 50 44.3	95 09 11.5	30—77.3211	0 00 02	1221
51A	P. Rock, S.M.	49 51 03.2	95 09 11.5	31—26.3484	0 00 02	1228
52	Wo. and I.P.	49 51 36.2	95 09 11.5	31—77.1021	0 00 07	1211
52A	P. Rock, S.M.	49 51 58.5	95 09 11.5	32—31.3024	0 00 07	1228
53	Wo. and I.P.	49 52 28.3	95 09 11.5	32—77.0323	359 59 50	1200
53A	P. Rock, S.M.	49 52 35.7	95 09 11.5	33—08.3874	359 59 50	1220
54	Wo. and I.P.	49 53 20.3	95 09 11.5	33—76.9787	359 58 39	1188
54A	Concrete Mon.	49 53 36.4	95 09 11.5	34—21.6604	359 58 39	1262
55	Wo. and I.P.	49 53 52.2	95 09 11.5	34—45.9081	359 59 02	1150
56	Wo. and I.P.	49 54 12.3	95 09 11.5	34—76.8309	359 59 14	1232
56A	P. Rock, S.M.	49 54 33.4	95 09 11.5	35—29.2387	359 59 14	1277
57	Wo. and I.P.	49 55 04.3	95 09 11.5	35—76.6730	359 59 49	1243
57A	P. Rock, S.M.	49 55 21.5	95 09 11.5	36—23.0403	359 59 49	1271
58	Wo. and I.P.	49 55 54.3	95 09 11.5	36—73.4241	359 58 09	1162
59	Wo. and I.P.	49 56 17.0	95 09 11.5	37—28.4082	359 58 09	1163
60	Wo. and I.P.	49 56 48.3	95 09 11.6	37—76.3695	359 59 28	1243
60A	P. Rock, S.M.	49 56 54.9	95 09 11.6	38—06.5896	359 59 28	1266
60B	P. Rock, S.M.	49 57 29.4	95 09 11.6	38—59.5195	359 59 28	1260
61	Wo. and I.P.	49 57 40.3	95 09 11.6	38—76.2305	359 59 13	1188
62	Cross chiselled in Rock.	49 58 20.5	95 09 11.6	39—57.9992	359 59 13	1150
63	Wo. and I.P.	49 58 32.2	95 09 11.6	39—75.9602	359 58 23	1217
63A	Concrete Mon.	49 58 50.7	95 09 11.6	40—24.4958	359 58 23	1246
64	Wo. and I.P.	49 59 28.7	95 09 11.6	41—02.8305	359 58 50	1079
64A	P. Rock, S.M.	50 00 00.4	95 09 11.6	41—51.4755	359 58 50	1142
65	Wo. and I.P.	50 00 16.2	95 09 11.6	41—75.7598	359 59 16	1128
65A	P. Rock, S.M.	50 00 56.2	95 09 11.6	42—57.2009	359 59 16	1248
66	Wo. and I.P.	50 01 08.0	95 09 11.7	42—75.3731	359 58 24	1168
66A	P. Rock, S.M.	50 01 37.6	95 09 11.7	43—40.8321	359 58 24	1164
67	Wo. and I.P.	50 02 01.3	95 09 11.7	43—77.1136	359 59 36	1078
68	Wo. and I.P.	50 02 52.0	95 09 11.7	44—75.0352	359 57 58	1149
68A	P. Rock, S.M.	50 02 57.6	95 09 11.7	45—03.7360	359 57 58	1202
69	Wo. and I.P.	50 03 44.0	95 09 11.7	45—74.9492	359 59 38	1189
69A	Concrete Mon.	50 04 07.8	95 09 11.7	46—31.5466	359 59 38	1216
70	Wo. and I.P.	50 04 36.0	95 09 11.8	46—74.8145	359 59 17	1115
70A	P. Rock, S.M.	50 04 57.6	95 09 11.8	47—27.9857	359 59 17	1111
71	Wo. and I.P.	50 05 28.1	95 09 11.8	47—74.7882	359 58 37	1073
71A	P. Rock, S.M.	50 06 00.1	95 09 11.8	48—43.9853	359 58 37	1182
72	Wo. and I.P.	50 06 20.0	95 09 11.8	48—74.5416	0 00 14	1072

SUMMARY OF MONUMENT DATA—Continued

No.	Monument	Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth	Eleva- tion in feet above M.S.L.
	Type					° ' "
		° ' "	° ' "			° ' "
73	Wo. and I.P.	50 07 12·0	95 09 11·8	49—74·4382	359 58 05	1040
73A	P. Rock, S.M.	50 07 23·3	95 09 11·8	50—11·8170	359 58 05	1224
74	Wo. and I.P.	50 08 03·8	95 09 11·8	50—74·0236	359 58 53	1149
74A	P. Rock, S.M.	50 08 18·9	95 09 11·9	51—17·2187	359 58 53	1188
75	Wo. and I.P.	50 08 55·9	95 09 11·9	51—74·0045	359 59 30	1103
75A	P. Rock, S.M.	50 09 15·3	95 09 11·9	52—23·8754	359 59 30	1135
76	Wo. and I.P.	50 09 48·0	95 09 11·9	52—73·9842	359 59 09	1033
76A	Concrete Mon.	50 10 36·0	95 09 11·9	53—67·7552	359 59 09	1147
77	Wo. and I.P.	50 10 39·8	95 09 11·9	53—73·6485	0 00 29	1063
77A	P. Rock, S.M.	50 11 23·6	95 09 11·9	54—60·9424	0 00 29	1129
78	Wo. and I.P.	50 11 24·7	95 09 11·9	54—62·5221	359 59 23	1118
79	Mark chiselled in Rock.	50 11 26·2	95 09 11·9	54—64·9227	359 59 23	987
80	Wo. and I.P.	50 13 24·4	95 09 11·9	57—05·4217	359 58 10	990
81	Wo. and I.P.	50 14 08·0	95 09 12·0	57—73·3423	0 00 14	1065
81A	P. Rock, S.M.	50 14 14·6	95 09 12·0	58—03·4718	0 00 14	1107
82	Concrete Mon.	50 14 25·6	95 09 12·0	58—20·4854	359 59 58	1004
83	P. Rock, S.M.	50 15 51·5	95 09 12·0	59—72·3944	359 59 57	1058
84	P. Rock, S.M.	50 16 46·1	95 09 12·0	60—76·2395	359 59 59	1124
85	P. Rock, S.M.	50 18 12·9	95 09 12·0	62—49·6206	359 59 59	1079
86	Concrete Mon.	50 18 53·1	95 09 12·0	63—31·3183	0 00 00·5	1130
87	P. Rock, S.M.	50 20 09·6	95 09 12·0	64—68·8191	0 00 00·5	1113
88	P. Rock, S.M.	50 21 14·9	95 09 12·0	66—09·1956	359 59 57	1163
89	P. S.M.	50 22 26·7	95 09 12·0	67—39·4652	359 59 58·5	1117
90	Concrete Mon.	50 24 05·2	95 09 12·0	69—30·7507	0 00 00	1223
91	P. Rock, S.M.	50 25 08·4	95 09 12·0	70—47·8270	0 00 04	1169
92	P. Rock, S.M.	50 26 16·0	95 09 12·0	71—71·7283	0 00 05·5	1163
93	P. Rock, S.M.	50 27 59·9	95 09 12·0	73—71·2685	0 00 12	1196
94	P. Rock, S.M.	50 28 23·0	95 09 12·0	74—26·8119	0 00 00	1206
95	Concrete Mon.	50 29 30·0	95 09 12·0	75—49·6046	0 00 01	1232
96	P. Rock, S.M.	50 30 26·7	95 09 12·0	76—56·8242	359 59 58	1216
97	P. Rock, S.M.	50 31 57·0	95 09 12·0	78—35·4308	359 59 54	1227
98	P. Rock, S.M.	50 33 36·4	95 09 12·0	80—28·0810	359 59 58	1162
99	Concrete Mon.	50 34 46·4	95 09 12·0	81—55·6524	359 59 58	1129
100	P. Rock, S.M.	50 36 22·0	95 09 12·0	83—42·6133	359 59 58	1173
101	P. Rock, S.M.	50 37 42·1	95 09 12·0	85—05·5701	359 59 56	1180
102	P. Rock, S.M.	50 38 43·9	95 09 12·0	86—20·4872	359 59 57·5	1222
103	P. Rock, S.M.	50 40 00·9	95 09 12·0	87—58·7419	0 00 00	1164
104	Concrete Mon.	50 40 37·0	95 09 12·0	88—34·2192	359 59 58·5	1198
105	P. Rock, S.M.	50 42 11·3	95 09 12·0	90—19·0570	0 00 00	1143
106	P. Rock, S.M.	50 43 29·3	95 09 12·0	91—58·9386	0 00 00	1154
107	P. Rock, S.M.	50 44 33·3	95 09 12·0	92—77·2525	0 00 01·5	1170
108	P. Rock, S.M.	50 45 44·5	95 09 12·0	94—26·5780	0 00 01·5	1176
109	Concrete Mon.	50 46 07·2	95 09 12·0	94—61·5278	0 00 03	1194
110	P. Rock, S.M.	50 47 21·7	95 09 12·0	96—15·8922	359 59 56	1172
111	P. Rock, S.M.	50 48 26·3	95 09 12·0	97—35·2054	359 59 56	1119
112	P. Rock, S.M.	50 49 45·5	95 09 12·0	98—76·8984	0 00 02	1185
113	P. Rock, S.M.	50 50 09·3	95 09 12·0	99—33·3474	0 00 01	1182
114	Concrete Mon.	50 51 26·8	95 09 12·0	100—72·4838	0 00 01	1162
115	P. Rock, S.M.	50 51 50·0	95 09 12·0	101—28·0332	0 00 00	1174
116	P. Rock, S.M.	50 53 28·0	95 09 12·0	103—18·6060	0 00 00	1190
117	P. Rock, S.M.	50 54 12·7	95 09 12·0	104—07·3331	359 59 58	1173
118	P. Rock, S.M.	50 55 49·3	95 09 12·0	105—75·7331	0 00 01	1157
119	P. Rock, S.M.	50 56 54·7	95 09 12·0	107—16·2007	0 00 01	1156
120	Concrete Mon.	50 57 46·6	95 09 12·0	108—15·9509	0 00 01	1199
121	P. Rock, S.M.	50 58 40·8	95 09 12·0	109—19·112)	0 00 01	1149

SUMMARY OF MONUMENT DATA—Continued

No.	Monument Type	Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth	Eleva- tion in feet above M.S.L.			
						°	'	"	°
122	P. Rock, S.M.	50 59 36.1	95 09 12.0	110—24.2059	359 59 58	1186			
123	P. Rock, S.M.	51 01 12.3	95 09 12.0	112—11.9552	359 59 58	1152			
124	P. Rock, S.M.	51 02 10.4	95 09 12.0	113—21.1899	359 59 58	1129			
125	Concrete Mon.	51 03 59.9	95 09 12.0	115—29.3812	359 59 58	1124			
126	P. Rock, S.M.	51 05 29.4	95 09 12.0	117—06.9373	359 59 58	1130			
127	P. Rock, S.M.	51 07 01.6	95 09 12.0	118—68.5368	359 59 53	1118			
128	P. Rock, S.M.	51 08 09.1	95 09 12.0	120—12.2089	359 59 56	1146			
129	P. Pic M.	51 09 18.6	95 09 12.0	121—38.9460	359 59 59	1096			
130	Concrete Mon.	51 10 36.0	95 09 12.0	122—77.9450	0 00 01	1121			
131	P. Rock, S.M.	51 11 43.3	95 09 12.0	124—21.2989	0 00 02	1115			
132	P. Rock, S.M.	51 12 28.8	95 09 12.0	125—11.2299	359 59 57	1104			
133	P. Rock, S.M.	51 13 34.1	95 09 12.0	126—31.4899	359 59 52	1110			
134	P. Rock, S.M.	51 14 07.9	95 09 12.0	127—03.4888	359 59 59	1116			
135	Concrete Mon.	51 15 37.8	95 09 12.0	128—61.5241	0 00 01	1132			
136	P. Rock, S.M.	51 16 19.0	95 09 12.0	129—44.8631	0 00 02.5	1132			
137	P. Rock, S.M.	51 17 20.2	95 09 12.0	130—58.8592	0 00 02.5	1116			
138	P. Rock, S.M.	51 18 30.6	95 09 12.0	132—07.0910	0 00 04	1117			
139	P. Rock, S.M.	51 19 26.3	95 09 12.0	133—12.6622	359 59 59	1119			
140	Concrete Mon.	51 20 33.3	95 09 12.0	134—35.5410	0 00 02	1107			
141	P. Rock, S.M.	51 21 26.5	95 09 12.0	135—37.3485	0 00 01	1120			
142	P. Rock, S.M.	51 23 15.8	95 09 12.0	137—45.1585	359 59 56	1122			
143	P. Rock, S.M.	51 23 53.7	95 09 12.0	138—23.4173	359 59 51	1149			
144	P. Rock, S.M.	51 24 58.2	95 09 12.0	139—42.5964	359 59 59	1148			
145	Concrete Mon.	51 26 27.4	95 09 12.0	141—19.5172	0 00 03	1170			
146	P. Rock, S.M.	51 27 30.6	95 09 12.0	142—36.6303	0 00 03	1163			
147	P. Rock, S.M.	51 28 23.7	95 09 12.0	143—38.3158	0 00 00	1169			
148	Concrete Mon.	51 30 11.7	95 09 12.0	145—44.1575	0 00 00	1171			
149	P. Rock, S.M.	51 31 19.4	95 09 12.0	146—68.1796	0 00 00	1171			
150	P. Rock, S.M.	51 31 58.8	95 09 12.0	147—48.7576	359 59 59	1171			
151	P. Rock, S.M.	51 33 29.3	95 09 12.0	149—27.7856	359 59 59	1163			
152	P. Rock, S.M.	51 35 15.3	95 09 12.0	151—30.5884	0 00 01.5	1141			
153	Concrete Mon.	51 36 07.9	95 09 12.0	152—31.4682	359 59 59	1147			
154	P. Rock, S.M.	51 37 36.1	95 09 12.0	154—06.9134	359 59 59	1083			
155	P. Rock, S.M.	51 38 01.1	95 09 12.0	154—45.3567	0 00 00	1112			
156	P. Rock, S.M.	51 39 37.5	95 09 12.0	156—33.5187	0 00 01	1112			
157	Concrete Mon.	51 41 14.1	95 09 12.0	158—21.8905	0 00 00	1095			
158	P. Rock, S.M.	51 42 53.8	95 09 12.0	160—15.0564	359 59 54	1124			
159	P. Rock, S.M.	51 44 18.3	95 09 12.0	161—64.8662	359 59 54	1091			
160	P. Rock, S.M.	51 44 59.8	95 09 12.0	162—48.5857	359 59 51	1125			
161	Concrete Mon.	51 45 53.4	95 09 12.0	163—51.0299	0 00 08	1086			
162	P. Rock, S.M.	51 46 52.0	95 09 12.0	164—61.0815	0 00 00	1095			
163	P. Rock, S.M.	51 48 07.2	95 09 12.0	166—16.5470	0 00 00	1074			
164	P. Rock, S.M.	51 50 05.5	95 09 12.0	168—38.3607	359 59 58.5	1089			
165	Concrete Mon.	51 51 17.6	95 09 12.0	169—69.0745	359 59 57	1111			
166	P. Rock, S.M.	51 52 34.0	95 09 12.0	171—26.5369	359 59 55	1102			
167	P. Rock, S.M.	51 53 05.0	95 09 12.0	171—74.1517	359 59 58	1100			
168	P. Rock, S.M.	51 54 18.9	95 09 12.0	173—27.6532	359 59 58	1070			
169	P. Rock, S.M.	51 55 17.6	95 09 12.0	174—37.8441	359 59 58	1078			
170	Concrete Mon.	51 56 45.2	95 09 12.0	176—12.4701	359 59 58	1086			
171	P. Rock, S.M.	51 57 48.6	95 09 12.0	177—29.9516	0 00 02	1110			
172	P. Rock, S.M.	51 59 01.0	95 09 12.0	178—61.0885	0 00 05	1102			
173	P. Rock, S.M.	52 00 41.6	95 09 12.0	180—55.6809	0 00 05	1044			
174	Concrete Mon.	52 01 35.2	95 09 12.0	181—58.0060	0 00 01	1118			
175	P. Rock, S.M.	52 02 21.1	95 09 12.0	182—48.5986	0 00 02.5	1130			
176	P. Rock, S.M.	52 03 43.8	95 09 12.0	184—15.6249	0 00 01	1138			

SUMMARY OF MONUMENT DATA—Continued

No.	Monument Type	Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth			Eleva- tion in feet above M.S.L.
					°	'	"	
177	P. Rock, S.M.....	52 04 58.8	95 09 12.0	185—50.8294	0	00	01	1151
178	P. Rock, S.M.....	52 05 26.6	95 09 12.0	186—13.5304	0	00	00	1166
179	P. Rock, S.M.....	52 06 32.5	95 09 12.0	187—34.9310	359	59	58	1123
180	P. Rock, S.M.....	52 07 43.8	95 09 12.0	188—64.4576	359	59	59	1120
181	P. Rock, S.M.....	52 09 22.1	95 09 12.0	190—55.4181	0	00	00	1088
182	P. Rock, S.M.....	52 09 47.7	95 09 12.0	191—14.8342	0	00	01	1100
183	Concrete Mon.....	51 11 34.0	95 09 12.0	193—18.0984	0	00	00	1086
184	P. Rock, S.M.....	52 12 39.5	95 09 12.0	194—38.8264	359	59	59	1085
185	P. Rock, S.M.....	52 14 00.4	95 09 12.0	196—03.0259	359	59	59.5	1107
186	P. Rock, S.M.....	52 14 39.7	95 09 12.0	196—63.4547	359	59	59	1104
187	Concrete Mon.....	52 15 56.0	95 09 12.0	198—20.7045	359	59	59	1114
188	P. Rock, S.M.....	52 16 38.9	95 09 12.0	199—06.5549	359	59	58	1119
189	P. Rock, S.M.....	52 17 54.4	95 09 12.0	200—42.6974	0	00	00	1105
190	P. Rock, S.M.....	52 19 43.8	95 09 12.0	202—50.6988	0	00	00	1116
191	P. Rock, S.M.....	52 20 38.6	95 09 12.0	203—54.9120	0	00	00	1090
192	P. Rock, S.M.....	52 21 49.8	95 09 12.0	205—04.3540	0	00	00	1099
193	Concrete Mon.....	52 22 29.8	95 09 12.0	205—65.8000	0	00	02	1099
194	P. Rock, S.M.....	52 24 20.9	95 09 12.0	207—76.5843	0	00	04.5	1099
195	P. Rock, S.M.....	52 25 06.0	95 09 12.0	208—65.7832	0	00	00	1091
196	Concrete Mo.....	52 26 46.9	95 09 12.0	210—60.8916	0	00	00	1092
197	P. Rock, S.M.....	52 27 08.9	95 09 12.0	211—14.6306	0	00	00.5	1090
198	P. Rock, S.M.....	52 28 08.3	95 09 12.0	212—25.9573	0	00	01	1095
199	P. Rock, S.M.....	52 29 34.3	95 09 12.0	213—78.0939	0	00	01	1107
200	P. Rock, S.M.....	52 30 12.1	95 09 12.0	214—56.2235	0	00	00	1117
201	Concrete Mon.....	52 31 50.5	95 09 12.0	216—47.4160	0	00	01	1104
202	P. Rock, S.M.....	52 32 38.7	95 09 12.0	217—41.4141	0	00	02	1107
203	P. Rock, S.M.....	52 33 49.6	95 09 12.0	218—70.3472	0	00	02	1102
204	P. Rock, S.M.....	52 35 12.4	95 09 12.0	220—37.6860	0	00	00	1099
205	Concrete Mon.....	52 36 09.7	95 09 12.0	221—45.6882	0	00	00	1109
206	P. Rock, S.M.....	52 37 23.7	95 09 12.0	222—79.4668	0	00	00	1105
207	P. Rock, S.M.....	52 38 00.8	95 09 12.0	223—56.4647	359	59	59.5	1117
208	P. Rock, S.M.....	52 38 25.3	95 09 12.0	224—14.0185	359	59	59	1117
209	Concrete Mo.....	52 40 45.8	95 09 12.0	226—69.8986	0	00	00	1116
210	P. Rock, S.M.....	52 41 42.8	95 09 12.0	227—77.6119	0	00	00	1103
211	P. Rock, S.M.....	52 42 58.9	95 09 12.0	229—34.5759	0	00	00	1092
212	P. Rock, S.M.....	52 43 55.2	95 09 12.0	230—41.0259	359	59	59	1101
213	Concrete Mon.....	52 45 08.5	95 09 12.0	231—73.5847	359	59	58.5	1090
214	P. Rock, S.M.....	52 45 41.0	95 09 12.0	232—43.6424	359	59	57.5	1110
215	P. Rock, S.M.....	52 46 31.7	95 09 12.0	233—41.5795	359	59	59.5	1115
216	P. Rock, S.M.....	52 47 51.9	95 09 12.0	235—04.6846	359	59	59	1065
217	P. Rock, S.M.....	52 49 07.0	95 09 12.0	236—40.1736	359	59	59	1063
218	Concrete Mon.....	52 50 09.4	95 09 12.0	237—55.9994	359	59	59	1062
219	P. Rock, S.M.....	52 50 23.3	95 09 12.0	237—77.3863	359	59	59	1048
220	{Concrete Pier }.....	52 50 29.3	95 09 12.0	238—06.5653	44	25	50	1047
	{12th Base Line}							
220	Concrete Pier.....	52 50 29.3	95 09 12.0	0—0.0000	44	25	50	1047.12
221	P. Rock, S.M.....	52 50 31.4	95 09 08.6	0—4.5220	44	25	52	1051.73
222	P. Rock, S.M.....	52 51 30.2	95 07 33.3	1—51.1620	44	27	07	1048.73
223	P. Rock, S.M.....	52 51 58.2	95 06 48.0	2—31.3530	44	27	45	1094.64
224	P. Rock, S.M.....	52 52 21.2	95 06 10.6	3—00.9253	44	28	14	1096.48
225	P. Rock, S.M.....	52 53 18.5	95 04 37.6	4—44.3537	44	29	29	1079.73
226	Concrete Pier.....	52 53 57.4	95 03 34.4	5—48.1638	44	30	19	1084.08
227	P. Rock, S.M.....	52 54 44.4	95 02 17.9	6—69.4795	44	31	21	1058.34
228	P. Rock, S.M.....	52 55 27.5	95 01 07.8	8—02.3593	44	32	16	1077.68
229	P. Rock, S.M.....	52 56 44.8	94 59 01.8	10—09.1095	44	33	56	1069.34

SUMMARY OF MONUMENT DATA—Continued

No.	Monument Type	Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth	Eleva-					
						tion in feet above M.S.L.					
		°	'	"	°	'	"	Miles—Chains	°	'	"
230	Concrete Pier.....	52 57 39.2	94 57 33.1	11—46.3746	44 35 08	1075.19					
231	P. Rock, S.M.....	52 58 09.7	94 56 43.4	12—32.1359	44 35 48	1076.22					
232	P. Rock, S.M.....	52 59 23.4	94 54 42.9	14—31.2133	44 37 25	1050.33					
233	P. Rock, S.M.....	52 59 56.6	94 53 48.5	15—23.0708	44 38 07	1004.18					
234	P. Rock, S.M.....	53 00 42.3	94 52 33.6	16—41.7914	44 39 06	1059.60					
235	Concrete Pier.....	53 01 34.1	94 51 08.8	17—73.6314	44 40 16	1071.02					
236	P. Rock, S.M.....	53 01 53.5	94 50 37.1	18—35.4143	44 40 40	1045.09					
237	P. Rock, S.M.....	53 02 34.9	94 49 29.0	19—45.0971	44 41 34	992.15					
238	P. Rock, S.M.....	53 03 16.5	94 48 20.7	20—55.0248	44 42 29	1056.58					
239	P. Rock, S.M.....	53 04 15.3	94 46 44.1	22—22.1973	44 43 47	1029.24					
240	Concrete Pier.....	53 05 18.4	94 45 00.2	23—78.6774	44 45 10	1072.98					
241	P. Rock, S.M.....	53 05 52.0	94 44 05.0	24—71.3295	44 45 54	972.07					
242	P. Rock, S.M.....	53 06 29.9	94 43 02.4	25—73.4115	44 46 42	1017.32					
243	P. Rock, S.M.....	53 07 30.5	94 41 22.5	27—44.6363	44 48 03	1007.23					
244	P. Rock, S.M.....	53 08 10.1	94 40 17.0	28—50.4550	44 48 55	1033.88					
245	Concrete Pier.....	53 09 10.1	94 38 37.8	30—20.5155	44 50 14	1031.20					
246	P. Rock, S.M.....	53 09 53.9	94 37 25.5	31—35.2571	44 51 13	1012.01					
247	P. Rock, S.M.....	53 10 15.2	94 36 50.2	32—01.4402	44 51 40	1004.67					
248	P. Pit M.....	53 10 59.5	94 35 36.8	33—17.5453	44 52 39	996.61					
249	P. Rock, S.M.....	53 12 08.7	94 33 42.0	35—07.6464	44 54 12	1003.96					
250	Concrete Pier.....	53 12 35.8	94 32 57.0	35—66.4791	44 54 46	1004.58					
251	P. Pit M.....	53 13 37.1	94 31 15.1	37—39.5707	44 56 10	980.30					
252	P. Pit M.....	53 14 04.4	94 30 29.6	38—18.9243	44 56 45	993.79					
253	P. Pit M.....	53 14 55.9	94 29 03.9	39—50.7439	44 57 54	1004.40					
254	P. Rock, S.M.....	53 15 38.2	94 27 53.5	40—62.5611	44 58 51	1038.86					
255	P. Pit M.....	53 16 21.7	94 26 40.9	41—77.1230	44 59 49	998.69					
256	Concrete Pier.....	53 16 54.6	94 25 46.1	42—68.5469	45 00 32	1020.80					
257	P. Pit M.....	53 17 53.8	94 24 07.3	44—37.2223	45 01 51	941.07					
258	P. Pit M.....	53 18 51.5	94 22 30.8	46—02.7437	45 03 10	943.73					
259	P. Pit M.....	53 19 06.6	94 22 05.5	46—35.6474	45 03 30	952.47					
260	P. Pit M.....	53 19 52.1	94 20 49.2	47—54.7377	45 04 32	962.95					
261	P. Pit M.....	53 20 57.8	94 18 59.2	49—37.6409	45 05 59	959.45					
262	Concrete Pier.....	53 21 44.0	94 17 41.7	50—58.2733	45 07 00	946.30					
263	P. Pit M.....	53 22 04.2	94 17 07.7	51—22.2945	45 07 30	929.04					
264	P. Rock, S.M.....	53 23 06.8	94 15 22.5	52—78.7511	45 08 54	898.79					
265	P. Rock, S.M.....	53 23 45.4	94 14 17.6	54—02.8484	45 09 45	909.35					
266	Concrete Pier.....	53 24 36.6	94 12 51.5	55—34.3536	45 10 55	880.57					
267	P. Rock, S.M.....	53 24 59.3	94 12 13.2	56—03.8608	45 11 25	908.38					
268	P. Pit M.....	53 25 35.8	94 11 11.6	57—03.5689	45 12 15	854.19					
269	P. Rock, S.M.....	53 26 23.9	94 09 50.5	58—28.4190	45 13 20	873.30					
270	Concrete Pier.....	53 27 13.8	94 08 26.2	59—57.3825	45 14 29	876.77					
271	P. Pit M.....	53 28 28.8	94 06 19.4	61—61.1312	45 16 10	854.50					
272	P. Pit M.....	53 28 53.2	94 05 38.1	62—34.4485	45 16 44	863.63					
273	P. Rock Pit M.....	53 29 49.2	94 04 03.3	63—76.7430	45 17 59	841.32					
274	P. Pit M.....	53 30 19.0	94 03 12.9	64—61.7322	45 18 41	827.66					
275	P. Pit M.....	53 31 25.8	94 01 19.5	66—47.7247	45 20 12	827.55					
276	P. Pit M.....	53 31 52.2	94 00 34.6	67—25.6189	45 20 48	829.42					
277	Concrete Pier.....	53 32 53.3	93 58 50.7	68—79.2977	45 22 12	892.44					
278	P. Rock Pit M.....	53 33 32.8	93 57 43.6	70—05.5879	45 23 04	882.45					
279	P. Rock, S.M.....	53 34 22.4	93 56 19.0	71—34.2400	45 24 13	919.42					
280	P. Pit M.....	53 34 49.5	93 55 32.8	72—13.6002	45 24 50	922.91					
281	P. Rock, S.M.....	53 35 58.4	93 53 35.3	74—04.4696	45 26 25	949.38					
282	P. Rock, S.M.....	53 36 21.2	93 52 56.4	74—54.3227	45 26 56	987.69					
283	Concrete Pier.....	53 36 46.3	93 52 13.5	75—29.2946	45 27 31	975.51					
284	P. Rock, S.M.....	53 37 26.4	93 51 05.0	76—37.1513	45 28 26	937.23					

SUMMARY OF MONUMENT DATA—Continued

No.	Monument Type	Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth	Eleva- tion in feet above M.S.L.
		° ' "	° ' "	Miles—Chains		° ' "
285	P. Rock, S.M.....	53 38 13·0	93 49 45·2	77—59·3624	45 29 30	967·77
286	P. Rock, S.M.....	53 38 52·0	93 48 38·4	78—64·9682	45 30 24	946·95
287	P. Rock, S.M.....	53 39 32·4	93 47 29·1	79—73·5526	45 31 14	943·55
288	P. Rock, S.M.....	53 40 07·6	93 46 28·9	80—70·6188	45 32 08	925·78
289	Concrete Pier.....	53 40 39·1	93 45 34·8	81—59·8335	45 32 51	933·04
290	P. Pit M.....	53 41 41·4	93 43 47·7	83—36·6439	45 34 18	787·78
291	P. Pit M.....	53 41 58·8	93 43 17·9	83—74·6662	45 34 41	812·65
292	P. Rock Pit M.....	53 42 24·5	93 42 33·6	84—51·2215	45 35 17	820·41
293	Concrete Pier.....	53 43 46·5	93 40 12·5	86—71·3213	45 37 11	900·62
294	P. Rock Pit M.....	53 44 14·3	93 39 24·6	87—52·3408	45 37 49	770·43
295	Concrete Pier.....	53 44 15·6	93 39 22·3	87—55·3280		750·60
ISLAND LAKE						
295	0—00·0000	38 40 34	
296	P. Rock, S.M.....	53 44 31·1	93 39 01·4	0—30·4040	38 40 51	883
297	P. Rock, S.M.....	53 45 40·7	93 37 27·4	2—07·4708	38 42 06	868
298	P. Rock, S.M.....	53 46 46·1	93 35 58·8	3—56·3438	38 43 20	926
299	P. Rock set in Boulder.....	53 48 20·7	93 33 50·6	6—02·8139	38 45 04	933
300	Concrete Pier.....	53 50 01·1	93 31 34·3	8—40·7467	38 46 55	942
301	P. Rock, S.M.....	53 50 48·2	93 30 30·3	9—53·6259	38 47 47	938
302	P. Rock, S.M.....	53 52 12·7	93 28 35·5	11—60·1517	38 49 19	927
303	P. Rock, S.M.....	53 52 56·3	93 27 36·0	12—66·2731	38 50 06	927
304	P. Rock, S.M.....	53 54 42·6	93 25 11·0	15—36·1070	38 52 01	913
305	P. Rock, S.M.....	53 55 38·4	93 23 54·9	16—66·1485	38 53 01	888
306	Concrete Pier.....	53 57 07·4	93 21 53·1	19—01·9711	38 54 38	830
307	P. Rock.....	53 58 37·6	93 19 49·6	21—20·1641	38 56 15	840
308	Concrete Pier.....	54 00 16·0	93 17 34·7	23—54·5735	38 58 01	850
309	P. Rock, S.M.....	54 02 14·7	93 14 51·4	26—49·4272	39 00 10	780
310	P. Rock, S.M.....	54 03 11·2	93 13 33·7	28—01·1518	39 01 10	815
311	P. Rock, S.M.....	54 03 44·4	93 12 48·0	28—66·7126	39 01 44	825
312	Concrete Pier.....	54 04 47·1	93 11 21·5	30—30·8189	39 02 52	806
313	P. Rock, in pipe.....	54 06 05·7	93 09 33·0	32—26·5235	39 04 20	810
314	P. Rock, in pipe.....	54 08 06·7	93 06 45·7	35—26·0565	39 06 35	814
315	P. Rock, in pipe.....	54 09 00·1	93 05 31·7	36—51·9167	39 07 35	821
316	P. Rock, in pipe.....	54 10 13·1	93 03 50·4	38—36·5917	39 08 58	833
317	Concrete Pier.....	54 11 58·8	93 01 23·7	41—06·0337	39 11 04	773
318	P. Rock, in pipe.....	54 13 54·0	92 58 43·3	43—74·6564	39 13 24	779
319	P. Rock, in pipe.....	54 15 18·5	92 56 45·6	46—02·2362	39 15 02	801
320	P. Rock, in pipe.....	54 16 15·0	92 55 26·7	47—34·4003	39 16 03	809
321	Concrete Pier.....	54 18 00·9	92 52 58·6	50—04·7127	39 18 01	759
322	P. Rock, in pipe.....	54 19 36·8	92 50 44·3	52—35·1812	39 19 47	762
323	P. Rock, in pipe.....	54 20 24·2	92 49 37·7	53—49·5346	39 20 38	764
324	P. Rock, in pipe.....	54 21 27·0	92 48 09·7	55—14·2562	39 21 47	742
325	P. Rock, in pipe.....	54 22 56·5	92 46 03·9	57—32·1871	39 23 27	700
326	P. Rock, in pipe.....	54 24 07·7	92 44 23·5	59—14·0008	39 24 45	650
326 A	Concrete Pier.....	54 24 58·7	92 43 11·7	60—35·4790	39 25 44	665
327	P. Rock, in pipe.....	54 25 00·7	92 43 08·9	60—39·3120	39 25 46	665
328	P. Rock, in pipe.....	54 26 28·4	92 41 05·2	62—53·9277	39 27 44	670
329	P. Rock, in pipe.....	54 27 12·4	92 40 03·0	63—61·5819	39 28 37	683
330	P. Rock, in pipe.....	54 28 43·5	92 37 54·2	66—02·9184	39 30 26	689
331	Concrete Pier.....	54 29 44·3	92 36 27·9	67—44·1766	39 31 40	691
332	P. Rock, in pipe.....	54 30 44·6	92 35 02·5	69—04·2526	39 32 54	681
333	P. Rock, in pipe.....	54 32 22·8	92 32 43·0	71—40·0713	39 34 51	640
334	Concrete Pier.....	54 33 08·0	92 31 38·7	72—50·2056	39 35 48	652
335	P. Rock, in pipe.....	54 35 20·4	92 28 30·1	75—74·4164	39 38 31	671

SUMMARY OF MONUMENT DATA—Continued

No.	Monument	Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth	Eleva- tion in feet above M.S.L.						
	Type											
		°	'	"	°	'	"	Miles—Chains	°	'	"	
336	P. Rock, in pipe.....	54 36 29.3	92 26 51.6	77—52.0941	39 39 31	725						
337	P. Rock, in pipe.....	54 36 50.4	92 26 21.5	78—14.2529	39 39 55	721						
338	Concrete Pier.....	54 38 15.5	92 24 19.9	80—24.0866	39 41 34	634						
339	P. Rock, in pipe.....	54 39 24.7	92 22 40.7	82—02.4877	39 42 55	653						
340	P. Rock, in pipe.....	54 41 20.1	92 19 55.3	84—73.0040	39 45 10	649						
341	P. Rock, in pipe.....	54 43 07.1	92 17 21.4	87—47.1384	39 47 16	655						
342	P. Rock, in pipe.....	54 44 24.1	92 15 30.6	89—41.1309	39 48 46	627						
342 A	Concrete Pier.....	54 45 43.2	92 13 36.6	91—39.4450	39 50 19	604						
343	P. Rock, in pipe.....	54 45 44.0	92 13 35.4	91—41.0730	39 50 20	604						
344	P. Rock, in pipe.....	54 47 29.7	92 11 02.7	94—12.7218	39 52 19	630						
345	P. Rock, in pipe.....	54 48 00.2	92 10 18.6	94—73.8537	39 52 56	629						
346	P. Rock, in pipe.....	54 48 58.6	92 08 54.2	96—30.7371	39 54 11	605						
347	P. Rock, in pipe.....	54 50 55.5	92 06 04.6	99—25.1766	39 56 36	590						
348	P. Rock, in pipe.....	54 52 54.6	92 03 11.6	102—24.0200	39 58 44	572						
349	Concrete Pier.....	54 54 51.8	92 00 21.0	105—19.1292	40 01 01	541						
350	P. Rock, in pipe.....	54 56 05.9	91 58 33.0	107—07.8727	40 02 29	512						
351	P. Rock, in pipe.....	54 56 12.4	91 58 23.5	107—20.9461	40 02 33	506*						
352	P. Rock, in pipe.....	54 57 58.2	91 55 48.9	109—73.4585	40 04 39	487						
353	P. Rock, in pipe.....	54 58 19.7	91 55 17.4	110—36.6792	40 05 02	485						
354	P. Rock, in pipe.....	54 59 30.9	91 53 33.2	112—19.7873	40 06 26	457						
355	P. Rock, in pipe.....	55 00 26.6	91 52 11.6	113—51.6747	40 07 31	434						
356	Concrete Pier.....	55 01 08.7	91 51 09.8	114—56.3777	40 08 19	393						
357	P. Rock, in pipe.....	55 02 18.6	91 49 27.1	116—37.0260	40 09 43	407						
358	P. Rock, in pipe.....	55 03 11.1	91 48 10.0	117—62.5420	40 10 47	402						
359	P. Rock, in pipe.....	55 03 54.6	91 47 05.9	118—70.101	40 11 40	394						
360	P. Rock, in pipe.....	55 05 36.5	91 44 35.8	121—35.200	40 13 43	387						
361	Concrete Pier.....	55 06 55.8	91 42 38.7	123—34.878	40 15 20	381						
362	P. Rock, in pipe.....	55 08 45.4	91 39 56.6	126—15.782	40 17 33	387						
363	P. Rock, in pipe.....	55 09 42.4	91 38 32.3	127—50.545	40 18 39	394						
364	P. Rock, in pipe.....	55 10 23.7	91 37 30.9	128—53.967	40 19 26	390						
365	P. Rock, in pipe.....	55 12 24.2	91 34 32.2	131—56.869	40 21 49	375						
366	P. Rock, in pipe.....	55 12 55.0	91 33 46.2	132—39.170	40 22 27	375						
367	P. Rock, in pipe.....	55 13 40.4	91 32 38.8	133—50.627	40 23 39	363						
368	Concrete Pier.....	55 14 44.7	91 31 03.0	135—20.433	40 24 59	343						
369	P. Rock, in pipe.....	55 15 25.5	91 30 02.1	136—22.932	40 25 48	353						
370	P. Rock, in pipe.....	55 16 11.9	91 28 52.9	137—36.610	40 26 45	358						
371	P. Rock, in pipe.....	55 16 54.5	91 27 49.3	138—42.602	40 27 37	361						
372	P. Rock, in pipe.....	55 17 24.4	91 27 04.5	139—23.178	40 28 18	361						
373	P. Rock, in pipe.....	55 18 27.3	91 25 30.4	140—70.313	40 29 39	353						
374	P. Rock, in pipe.....	55 19 30.8	91 23 55.3	142—38.695	40 31 01	365						
375	P. Rock, in pipe.....	55 20 17.3	91 22 45.6	143—52.745	40 31 58	359						
376	Concrete Pier.....	55 21 28.7	91 20 58.5	145—37.041	40 33 24	345						
377	P. Rock, in pipe.....	55 23 26.5	91 18 01.3	148—35.494	40 35 48	364						
378	P. Rock, in pipe.....	55 24 24.9	91 16 33.3	149—73.733	40 36 58	387						
379	P. Rock, in pipe.....	55 25 36.8	91 14 44.9	151—59.402	40 38 25	392						
380	P. Rock, in pipe.....	55 26 54.8	91 12 47.0	153—57.510	40 39 59	369						
381	P. Rock, in pipe.....	55 27 40.8	91 11 37.5	154—70.704	40 40 57	357						
382	Concrete Pier.....	55 28 10.0	91 10 53.2	155—50.045	40 41 36	345						
383	P. Rock, in pipe.....	55 29 50.0	91 08 21.8	158—12.689	40 43 40	337						
384	P. Rock, in pipe.....	55 30 20.3	91 07 35.8	158—74.231	40 44 21	357						
385	P. Rock, in pipe.....	55 31 34.5	91 05 43.1	160—64.783	40 45 56	387						
386	P. Rock, in pipe.....	55 33 13.6	91 03 12.3	163—26.025	40 48 03	417						
387	P. Rock, in pipe.....	55 34 23.0	91 01 26.6	165—07.001	40 49 33	429						

*(18th Base Line, Manitoba Lands Surveys 1935)

SUMMARY OF MONUMENT DATA—Continued

No.	Monument Type	Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth	Eleva- tion in feet above M.S.L.
		° ' "	° ' "	Miles—Chains	° ' "	
388	P. Rock, in pipe	55 35 10·3	91 00 14·4	166—23·076	40 50 36	432
389	P. Rock, in pipe	55 36 51·6	90 57 39·6	168—69·065	40 52 47	418
390	P. Rock, in pipe	55 38 27·4	90 55 13·0	171—23·866	40 54 52	422
391	P. Rock, in pipe	55 39 41·7	90 53 19·0	173—15·101	40 56 29	428
392	P. Rock, in pipe	55 40 25·5	90 52 11·8	174—24·280	40 57 17	431
393	P. Rock, in pipe	55 42 08·5	90 49 33·5	176—73·963	40 59 27	424
394	P. Rock, in pipe	55 42 29·7	90 49 00·9	177—37·093	40 59 54	437
395	P. Rock, in pipe	55 42 54·4	90 48 22·8	178—07·457	41 00 16	440
396	P. Rock, in pipe	55 44 23·9	90 46 04·9	180—29·799	41 02 09	457
397	P. Rock, in pipe	55 45 41·8	90 44 04·6	182—28·574	41 03 48	463
398	Concrete Pier	55 46 38·1	90 42 37·5	183—63·446	41 04 59	490
399	P. Rock, in pipe	55 47 22·8	90 41 28·3	184—74·708	41 05 56	497
400	P. Rock, in pipe	55 49 15·7	90 38 33·3	187—65·144	41 08 24	486
401	P. Rock, in pipe	55 49 42·7	90 37 51·5	188—40·134	41 09 01	490
402	P. Rock, in pipe	55 50 54·2	90 36 00·3	190—26·188	41 10 36	495
403	P. Rock, in pipe	55 51 45·5	90 34 40·5	191—51·057	41 11 42	492
404	P. Rock, in pipe	55 53 05·5	90 32 35·9	193—54·557	41 13 19	485
405	P. Rock, in pipe	55 54 53·0	90 29 48·1	196—34·373	41 15 38	494
406	Concrete Pier	55 55 17·0	90 29 10·6	197—03·446	41 16 09	512
407	P. Rock, in pipe	55 56 50·8	90 26 43·9	199—35·389	41 18 11	516
408	P. Rock, in pipe	55 57 26·1	90 25 48·6	200—27·599	41 18 56	519
409	P. Rock, in pipe	55 58 52·5	90 23 33·1	202—44·557	41 20 49	532
410	P. Rock, in pipe	55 59 38·0	90 22 21·7	203—57·672	41 21 48	547
411	P. Rock, in pipe	56 00 53·8	90 20 22·6	205—52·949	41 23 23	542
412	P. Rock, in pipe	56 01 48·8	90 18 55·9	207—05·771	41 24 35	552
413	P. Rock, in pipe	56 03 29·7	90 16 16·9	209—52·580	41 26 47	578
414	P. Rock, in pipe	56 03 51·5	90 15 42·5	210—17·322	41 27 15	583
415	Concrete Pier	56 05 10·9	90 13 37·0	212—20·239	41 29 01	582
416	P. Rock, in pipe	56 06 27·8	90 11 35·3	214—18·041	41 30 44	586
417	P. Rock, in pipe	56 07 45·7	90 09 31·8	216—18·123	41 32 29	578
418	P. Rock, in pipe	56 08 05·9	90 08 59·7	216—59·603	41 32 58	576
419	P. Rock, in pipe	56 08 41·9	90 08 02·6	217—53·585	41 33 47	559
420	P. Rock, in pipe	56 09 45·7	90 06 21·2	219—24·709	41 35 06	513
421	P. Rock, in pipe	56 11 16·0	90 03 57·4	221—50·462	41 36 59	480
422	P. Rock, in pipe	56 12 03·4	90 02 41·9	222—67·857	41 38 02	491
423	P. Rock, in pipe	56 13 45·2	89 59 59·4	225—37·335	41 40 19	453
424	P. Rock, in pipe	56 14 59·1	89 58 01·3	227—29·446	41 41 59	437
425	Concrete Pier	56 16 36·6	89 55 25·0	229—70·409	41 44 11	396
426	P. Rock, in pipe	56 17 02·3	89 54 43·7	230—43·387	41 44 43	388
427	P. Rock, in pipe	56 18 31·2	89 52 21·0	232—66·610	41 46 40	346
428	P. Rock, in pipe	56 19 23·0	89 50 57·8	234—13·331	41 47 49	341
429	P. Rock, in pipe	56 20 31·8	89 49 07·0	235—75·258	41 49 20	317
430	P. Rock, in pipe	56 21 16·8	89 47 54·5	237—08·092	41 50 19	320
431	P. Rock, in pipe	56 23 01·5	89 45 05·4	239—64·314	41 52 39	290
432	P. Rock, in pipe	56 23 30·7	89 44 18·3	240—44·505	41 53 18	290
432 A	Concrete Pier	56 23 30·7	89 44 18·2	240—44·649	41 53 18	290
433	P. Rock, in pipe	56 25 24·2	89 41 14·5	243—39·043	41 55 52	254
434	P. Rock, in pipe	56 26 00·8	89 40 15·0	244—34·845	41 56 43	254
435	P. Rock, in pipe	56 27 22·0	89 38 03·3	246—42·682	41 58 34	245
436	P. Rock, in pipe	56 28 14·6	89 36 37·7	247—71·510	41 59 47	240
437	P. Rock, in pipe	56 29 08·8	89 35 09·5	249—23·678	42 01 02	220
438	P. Rock, in pipe	56 29 52·6	89 33 58·2	250—34·309	42 02 01	211
439	P. Rock, in pipe	56 31 00·6	89 32 07·3	252—15·104	42 03 32	202
440	P. Rock, in pipe	56 31 49·0	89 30 48·2	253—35·395	42 04 37	192
441	P. Rock, in pipe	56 32 55·4	89 28 59·8	255—12·852	42 06 06	180

SUMMARY OF MONUMENT DATA—Concluded

No.	Monument	Latitude (N)	Longitude (W)	Distance from Mile 0	Forward Azimuth	Eleva- tion in feet above M.S.L.
	Type	"	"	Miles	Chains	"
442	P. Rock, in pipe.....	56 33 35.6	89 27 54.0	256—16.149	42 06 59	179
443	P. Rock, in pipe.....	56 34 10.0	89 26 57.5	257—07.613	42 07 45	176
444	P. Rock, in pipe.....	56 34 47.0	89 25 56.9	258—04.329	42 08 34	172
445	Concrete Pier.....	56 35 55.1	89 24 05.1	259—65.597	42 10 07	170
446	P. Rock, in pipe.....	56 37 11.4	89 21 59.9	261—63.728	42 11 50	131
447	P. Rock, in pipe.....	56 37 49.9	89 20 56.6	262—63.641	42 12 41	126
448	P. Rock, in pipe.....	56 39 44.8	89 17 47.1	265—62.387	42 15 19	112
449	P. Rock, in pipe.....	56 40 46.7	89 16 04.9	267—31.076	42 16 44	96
450	P. Rock, in pipe.....	56 41 43.5	89 14 31.1	268—69.044	42 18 08	97
451	P. Rock, in pipe.....	56 42 57.0	89 12 29.5	270—61.817	42 19 49	83
452	P. Rock, in pipe.....	56 44 17.1	89 10 16.6	272—68.575	42 21 41	75
453	P. Rock, in pipe.....	56 45 16.9	89 08 37.4	274—32.963	42 23 03	57
454	P. Rock, in pipe.....	56 46 17.6	89 06 56.4	275—79.386	42 24 28	48
455	P. Rock, in pipe.....	56 47 20.8	89 05 11.3	277—50.937	42 25 56	44
456	P. Rock, in pipe.....	56 48 06.8	89 03 54.5	278—66.900	42 27 00	29
456 A	Concrete Pier.....	56 48 06.9	89 03 54.4	278—67.123	42 27 00	29
457	P. Rock, in pipe.....	56 48 56.2	89 02 32.1	280—09.871	42 28 09	29
457 A	Concrete Pier.....	56 50 24.3	89 00 05.0	282—33.571	42 30 12	8
458	(Wit.) P. Rock mkd. W.T. 2.....	56 50 24.6	89 00 04.5	282—34.133	42 30 13	8
458	(Terminal)P. Rock, in pipe	56 50 25.6	89 00 02.9	282—36.133	42 30 14	SeaLevel

APPENDIX III

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No. 7

REPORT OF SURVEY OF THE BOUNDARY BETWEEN ONTARIO AND MANITOBA

TORONTO, 30th April, 1898.

To the HON. CLIFFORD SIFTON,
Minister of the Interior,
Ottawa,
and HON. J. M. GIBSON,
Commissioner of Crown Lands,
Toronto.

Sirs,—We have the honour to submit the following report on the survey of the boundary line between the Provinces of Ontario and Manitoba performed in accordance with instructions from your Departments, dated the 21st and 19th of August, 1897, respectively.

After visiting Ottawa in company with the director of surveys for Ontario and conferring with the Deputy Minister of the Interior and the Surveyor General of the Dominion, we proceeded to arrange for the work and after due preparation, left for Rat Portage with our staff. At this point we engaged the remainder of our party, purchased our supplies and having hired a small steamer to carry the party and outfit to the point of commencement of the line near the north-west angle of the Lake of the Woods, we left Rat Portage on the first of September, reaching the North-west Angle River the same evening, and camped near where we were to begin our work. This point is marked upon the ground by an iron monument planted about six chains north of the North-west Angle River and it was from this monument that measurements were taken to locate the initial point of the Ontario and Manitoba boundary. This monument and a similar one at a distance of thirty-nine chains and thirty-nine links due north of it were planted by the International Boundary Commissioners in 1872 and mark the boundary at these points between Canada and the United States. They are the iron posts referred to in the above mentioned instructions and are also shown in the plan and field-notes herewith submitted. It will be noticed that the distance between these two iron posts or monuments, as deduced from the figures given in our instructions, is thirty-nine chains and thirty links, whereas our measurements as checked on the ground show it to be thirty-nine chains and thirty-nine links.

It may be well to state that all our measurements along the line were taken by two different sets of chainmen, each set using a Chesterman steel tape, one of which was sixty-six feet and the other one hundred feet in length.

Pages 88 to 90 of the returns show a comparative statement of the measurements with each chain for each mile.

In fixing the north-west point, which was to be our initial point, we made it 150 chains and one link north from the first mentioned, or south monument.

The boundary we were called upon to lay down is defined in Chap. 28, 52 Vic., 1888-89, of the Imperial Parliament in the following words: "Thence along a line drawn due north until it strikes the middle line of the course of the river discharging the waters of the lake called Lake Seul, or the Lonely Lake, whether above or below its confluence with the stream flowing from the Lake of the Woods towards Lake Winnipeg."

Having taken an astronomical observation for azimuth on the evening of the 1st of September, at our point of commencement, the work of opening the line was begun on the following day. We then continued the line due north to its intersection with the Winnipeg River at a point about seven miles below the mouth of the English River the distance from the initial point at the north-west angle to a post which we planted on the left bank of the Winnipeg River, and 20 links from the water's edge, being 58 miles, 27 chains and 20 links. The Winnipeg River at this point is about 15 chains wide.

In running and laying down the line two instruments were used: one a small light transit, in charge of one of our assistants who kept near the axemen and directed them in their work of opening and clearing the line, the other a Dominion lands reiteration transit theodolite, with which astronomical observations were taken, and by means of which the line was actually laid down from the points of greatest elevation along its course, thus insuring as long sight as possible consistent with accuracy. These sights, as will be seen from the field notes, averaged over a mile in length and as a "sky line" was cut out in advance, all instrumental stations were well selected, so that in many cases under favourable conditions two back stations could be seen in the production of the line. By this means, as will be noticed from the table of observations, only slight corrections in azimuth were found necessary. Owing to the intense cold and cloudy weather from the latter part of November up to the time of the completion of the field work on the 11th of December, we found it impossible to get the exact result from the observations that we attempted to take at different points towards the end of the work. Two of these latter observations, though not entirely satisfactory owing to the frost interfering with the movements of the plates of the instrument, were sufficient to show that the line was within reasonable limit of error, and not out more than the average error shown by previous observations.

The initial point being under water it was impossible to mark it upon the ground by a post or monument and it will therefore be seen that the first posts planted are situated on hard ground at 25·00 chains on the first mile. They consist of a cedar post with an iron post alongside, each being marked with the words "ONT." on the east side and "MAN." on the west side with the additional wording "25 chains north of the N.W. Angle" on the south side of the cedar post.

Each and every mile of the boundary excepting where the mile point falls in water is defined by similar posts each marked with the words "ONT." and "MAN." with the number of the mile from the initial point followed by the letter "M" on the south side.

Bearing trees where available were taken and regularly marked as shown in the field-notes, and the trees on either side of the line throughout the work were blazed on the three sides as directed. In addition to the regular mile posts good cedar posts with iron posts alongside were planted on the shores of Shoal Lake, Snow Shoe Bay and Indian Bay and all the larger lakes and also on the islands crossed by the line in Indian Bay and High Lake; these are marked on the east and west sides the same as those above mentioned, while the cedar post in each and every instance has the distance from the initial point marked on its south side. Similar cedar and iron posts were planted at the intersection of the line with the southerly and northerly limits of the right of way of the Canadian Pacific Railway, marked "ONT." on the east side, and "MAN." on the west side and "C.P.R." on the side facing the right of way.

Although not instructed to do so we planted wooden posts at the intersection of our line with the boundaries of the Indian Reserves met with in the work. These posts have the words "ONT." and "MAN." on the east and west sides respectively and "I.R." on the side facing the reserve. A cedar post also, marked as above on the east and west sides, was planted at the intersection of the portage from Long Pine Lake to West Hawk Lake, being on a frequently travelled route.

With the exception of six, all the above mentioned posts are surrounded with well built cairns of stones called stone mounds in the field-notes. The field-notes show explicitly how each and every post is marked as well as their position.

The lines run in the survey of Dominion lands, Indian reserves and mining locations in the vicinity of the boundary were connected with our work.

A careful traverse with transit and chain was also made along the line of the Canadian Pacific Railway eastward from the boundary to the Dominion Government astronomical station at Kalmar and the latitudes and departures of the various courses in this traverse were duly calculated and are shown in the field-notes. The boundary line is intersected by the Canadian Pacific Railway at a point distant twenty-eight miles and seventy-three chains from

the initial point at the north-west angle. This point of intersection is very nearly ninety-nine and three-quarters miles east of Winnipeg, and about two miles west of Ingolf station.

In addition to the running of the boundary line and the traverse of the Canadian Pacific Railway considerable micrometer work was done in the traversing of parts of Shoal Lake, Indian Bay, High Lake and West Hawk Lake, also in the survey of that part of the Winnipeg River and its expansions from our line easterly to the mouth of the English River.

The results of the explorations on either side of the line are shown upon the plans herewith.

The country on each side of the North-west Angle River is comparatively level and the soil is of good quality. The chief timber is poplar. On proceeding north the land becomes swampy up to Shoal Lake and is thinly timbered with spruce and tamarac.

After leaving the bay of Shoal Lake higher land is reached, broken with hills and swamps. The soil is clay and the rocks belong to the Laurentian and Huronian formations; the timber consists of poplar, birch and pitch pine. This class of country extends to the neighbourhood of Rice Bay and from there to Snow-Shoe Bay is quite broken and the timber has been very nearly all destroyed by fires.

Indian Bay is a fine sheet of water about five miles long and two wide, and contains a number of islands of various sizes nearly all of which are wooded with green timber, principally birch, spruce, poplar and cedar, with a few clumps of white pine. Some very good oak timber was noticed at the narrows leading from the bay into Shoal Lake. Between Indian Bay and High Lake the land is hilly and covered with green timber; the soil is sandy, with frequent rock exposures.

The line crosses a point and two islands in High Lake and intersects the third base line of the Dominion system of surveys on the most northerly of the latter.

From High Lake to the thirty-second mile post the country is mostly burnt, and a large portion was entirely stripped of timber by the far-reaching and destructive fire which extended east from the prairie in the fall of 1897.

The country in both provinces adjoining the boundary south of the Canadian Pacific Railway is attracting considerable attention from mining men at the present time owing to the discoveries of gold in the vicinity, and numerous mining locations and claims have already been laid out and evidences of development work were seen in a number of places.

The contacts between Laurentian and Huronian rocks are noted in the field-notes where they were visible, and the last contact we saw occurs near the centre of the twenty-seventh mile, and from this point to the end of the work

only Laurentian rocks were seen. North of the Canadian Pacific Railway the country as a rule is very rocky and broken with very little soil fit for cultivation. It contains numerous lakes with clear water well stocked with fish.

The timber consists of pitch-pine, poplar, spruce, birch and tamarac, where not completely destroyed by fire. The effect of the recent and destructive fire above referred to was not entirely lost sight of until we reached the neighbourhood of Trout Lake on the forty-first mile, although some belts had escaped its ravages.

From Trout Lake to the Winnipeg River the timber is generally small and of poor quality, consisting of pitch-pine, birch, spruce and tamarac. Some railway ties have been taken out in the vicinity of the thirty-third and thirty-fourth miles and a few swamps farther north contain a small quantity of fair sized spruce and tamarac. It is perhaps worthy of note to mention that no cedar timber exists between the Canadian Pacific Railway and the Winnipeg River along the line, and our wooden posts for this portion of the work were all brought from West Hawk Lake.

As stated in the first part of this report the boundary line strikes the stream of the Winnipeg River at a point about seven miles below the confluence of the English River with the former.

The waters of the two rivers unite in a wide lake-like expansion having some ten or twelve islands in it. They pass to the north and west of a large island and unite again in a narrow channel and after a short distance once more divide and pass to the north and south of another large island about two and one-half miles long and one and one-half miles wide. Upon each of these latter divergent streams there is a water-fall of five or six feet, the northerly one being again divided in two by a small island; these two main divergent streams flow, the one along the north side and the other along the east, south and west sides of the last mentioned large island, and after having widened out into lake-like areas unite about one mile up stream from where the boundary line intersects the river proper. There are a number of islands in all these stretches and the main shores are generally rugged. The exact position of these two rivers between their junction and our line is shown on the plan of the boundary line herewith, and on the traverse sheet accompanying the field-notes.

The necessity for having the boundary line laid down has been felt for some time by the people in the vicinity, especially so in that portion south of the railway where mining work has been going on.

The route we travelled in the prosecution of the work is shown on the plan.

After completing the field work we returned with our men to Ingolf by way of North Crow Duck Lake and a chain of lakes leading to Cross Lake and down the latter to the Canadian Pacific Railway and thence to Rat Portage where our men were paid off. It was then decided that we should meet in Toronto for the purpose of preparing our returns of survey.

In concluding this report which we have made as brief as possible, we desire to say that any differences of opinion which we may have had in carrying out the work were all satisfactorily adjusted by ourselves.

We desire to express our gratitude to the officials of both the Department of the Interior and the Department of Crown Lands with whom we came in contact in connection with the work, for their many courtesies extended to us, and to thank the members of our staff for their untiring efforts in the prosecution of the survey.

Herewith will be found full returns in triplicate, one copy being for the Dominion, one for Ontario and one for Manitoba.

We have the honour to be, Sirs,
Your obedient servants,

E. STEWART,
B. J. SAUNDERS,

*Dominion and Ontario Land Surveyors,
Boundary Commissioners.*

INTERNATIONAL BOUNDARY
MAP
of the vicinity of the
NORTHWEST POINT
of the
LAKE OF THE WOODS

Anomalous position of Boundary strictly in accordance with Treaty of 1908.... — — —

Boundary in accordance with Article I of the New Treaty (1925)..... _____

Two small areas of water, at present owned by the United States but completely surrounded by Canadian waters, which Article I of the New Treaty will transfer to Canada
Total area $2\frac{1}{2}$ acres..... 

Scale in feet
500 0 500 1000 1500

M A N I T O B A

WEST REFERENCE MONUMENT

New Position of
N.W. Point (1925)

EAST REFERENCE
MONUMENT

O N T A R I O

M I N N E S O T A

From tracing by the International Boundary Commission, 1925.

VICINITY OF THE NORTHWEST POINT OF LAKE OF THE WOODS.
International Boundary Commission, 1925

APPENDIX IV

EFFECTS OF THE 1925 TREATY BETWEEN THE DOMINION OF CANADA AND THE UNITED STATES OF AMERICA ON THE ONTARIO—MANITOBA BOUNDARY

By the 1925 Treaty, the most northerly point on the international boundary in the northwest angle of Lake of the Woods was moved 4,785 feet due south in order to cede to the Dominion two small parcels of water-covered land which had inadvertently become part of the United States of America by the Ashburton Treaty of 1842, and which were completely surrounded by Canadian waters. The 1842 Treaty had defined the international boundary in this area as the water line through Lake of the Woods to the northwest angle as the latter was determined on the ground by Dr. Tiarks and David Thompson in 1825, and then due south to the 49th parallel before turning west. Surveys undertaken in connection with the Treaty of 1908 revealed that the stream line of the Northwest Angle Inlet crossed the above-mentioned due south line in five places, thus isolating two parcels of United States territory, as shown on the accompanying map. The 1925 Treaty shifted the point of the northwest angle just far enough south to remove the anomaly and to cede the two parcels of land to Canada.

These parcels which by the Manitoba Boundary Extension Act of 1912 were intended to form part of Manitoba became in fact part of the province of Manitoba by a provincial Act of consent in 1928 and by a Federal Act of confirmation in 1930 (22, 28, App. I).

The 1925 Treaty had the effect of extending the interprovincial boundary southward from the original initial point at the old northwest angle to the new position of the northwest angle. According to the Department of Justice and the law officers of the Crown for the Province of Ontario, the intent of the various boundary Acts was that the interprovincial boundary should be the middle thread of the Northwest Angle Inlet between the new and old northwest angle points, and not the meridian between the two.

APPENDIX V

PHOTOGRAPHS OF TYPICAL OR KEY MONUMENTS



INITIAL POINT OF THE BOUNDARY

Monument No. 1, the original 1897 cedar post marking the northwest angle of Lake of the Woods, as found by J. W. Pierce in the 1932 retracement-restoration survey.



TYPICAL CONCRETE MONUMENT

Monument 76A was one of the auxiliary monuments placed on the boundary in the 1932 retracement survey.

STARTING POINT OF 1932 RETRACEMENT

Monument 82 on the south bank of the Winnipeg River was erected in the 1921-22 survey. It also marked the starting point of the latter survey from the Winnipeg River to the twelfth base line.



STARTING POINT OF THE 1929 SURVEY
Monument 220 at the centre of the road allowance at the intersection of the twelfth base line and the meridian part of the boundary from Lake of the Woods.



MOST EASTERN POINT OF ISLAND LAKE
Monument 295, marking the critical Point "A", was established on the terminal of the 1929 trial line. The view is west into the Lake.



TYPICAL STONE MOUND MONUMENT
Monument 225 was erected in 1930 on the 1929 trial line. The view is southwest.



TYPICAL BEARING-TREE
Monument 420 on the 1947-48 trial line.



STARTING POINT OF THE 1947-48 SURVEY
Monument 356 at Echoing River is representative of the concrete monuments erected by D. E. Guard in 1950. This also marks the terminal point of the 1937 survey.



ESTABLISHING A MONUMENT
Monument 452 is being referenced to a typical squared stump during the 1947-48 survey.



NEAR THE COAST OF HUDSON BAY

Monument 456A was erected in the 1950 survey. The metal container was one of those used for dropping cement from the aircraft.



THE BOUNDARY TERMINAL MONUMENT

Monument 457A was erected in 1950 at the terminal of the 1948 trial line. The wooden target in the background stands over C. H. Ney's 1930 monument.

